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OUR GREAT TRIAL OFFER.

To afford the opportunity to mechanics and others of examining and testing the value of The TRADE REVIEW AND WESTERN MACHINIST, to themselves, the Proprietor will send this Journal three months, for only FIFTY CENTS, postage paid, to any address in this country or Canada.

THE PRICE OF COPPER.

A New York contemporary considers that the leading copper companies of Michigan have been dealt somewhat unjustly with, in being decried as a monopoly, and it implies in its remarks that really more copper is produced than the country can consume. But what we affirm is that all that is needed to vastly increase the consumption of this metal is a reduction in the price. It thus apologises for the action of the companies in seeking to maintain an unreasonable price by shipments abroad: "We have in past years occasionally made more copper than we could consume, and producers were forced to market their surplus abroad at prices ruling in the French and English markets. When it has been possible, the copper to be sent abroad has been sold to American makers of cartridges at so low a price that they were in a position to underbid foreign competitors." As to the first allegation, all the copper could have been consumed here had it been offered to our manufacturers at the same price at which it was laid down in Liverpool. As to the sale to the cartridge manufacturers, below market rates, this was in pursuance of the same policy of restriction, the favoring of one particular trade to keep up prices for other manufacturers. Manufacturers are told in this article that they should be thankful for being guarded by the tariff against the invasion of foreign competitors, but this does not impugn the fact of the advantage that would accrue from the cheapening of copper for which an almost illimitable consumption could be found. Nor is the unreasonableness of the artificially maintained rates affected by the circumstance that the copper rolling-mills of the country form one of the most strongly bound trade associations known in this country, and their list prices are adhered to in fear of a heavy penalty. As is well known, the leading copper mining companies have during the past year secured more powerful machinery and greatly extended their operations, and at the present time English importers are negotiating for a supply at current London rates, rates at which it is impossible for the American manufacturers to buy.

BOILER CONSTRUCTION.

The Master Mechanics' Association, at its convention, received and discussed an interesting report on locomotive boiler construction. Much was brought forward of interest to all users of boilers. A most interesting and suggestive point was brought forward in Mr. Wells' report. He observed: "I have noticed many cases also where tube sheets "were much worn around the end of the tube in the "form of a counter sink, about ¼ inch wide and the "same in depth, around the lower and central tubes "the sheets becoming so thin as to require removal, "which at all other parts they were apparently good. "Such sheets were in nearly or quite every case in "fire-boxes of engines doing heavy work and having "boilers comparatively small for their cylinders and "work. In the case of copper tube sheets this de- "fect seems to be greater even than with steel sheets. "The cause of this cutting away of the sheet in the "form of a groove around the tube end is due, I sup- "pose, to the particles of coal and cinders drawn "towards the tube by the force of the draft, and "those striking the outer slope head on the end of the "tube, where it projects into the fire box, turn out- "ward toward or from the tube, striking the sheet, "and in time striking the groove or valley around "the end of the tube as stated, while the projecting "end of the tube itself suffers comparatively little, "the action of these particles of coal and cinders "on the sheet around the tube being the same as "that of sand in the sand blast machines for sharp- "ening files. If this theory is correct, then it will "be best to have as little projection of the tube end "as possible beyond the face of the sheet in the fire- "box. To countersink the tube hole sufficiently "to receive the head or flange on the end of the tube "without leaving a sloping projection on its outer "edge will add to the life of the sheet." The true theory and the true remedy appears here to have been stated. The character of coal as affecting the life of a boiler was properly dwelt on. Comparisons of the aging of boilers in which coal differing in character is used, should take this into account. The best quality of Pittsburgh is very different from Tennessee or Alabama coal. As to material of boilers and character of workmanship, it will be agreed by all that these should be as perfect as possible, and doubtless most boilers are strong enough when new, but no doubt a large proportion of the disasters that occur to boilers is in crediting them with too extended powers of resist ance to corrosion, unequal expansion, and the not taking into account the effect on strength of the springing of sheets through pressure, thus altering the original shape, and also of the strains from boiler attachments.

OUR FOREIGN TRADE.

It is all very well to speak of direct trade with foreign consumers, so as to secure full profits to to the manufacturer and exporter, but Consul Griffin writing from New Zealand very sensibly remarks: "Services, however, of the middleman are not unfrequently valuable. He is often the means of furnishing information to the consumer which the latter could not otherwise obtain. Besides, the commission merchant is generally well posted in all kinds of manufactures, a knowledge which he has acquired by hard study and long experience, and it stands to reason and common sense that he would select such articles for his customers as would give the most satisfaction, both in regard to price and quality; but it is nevertheless true that these articles cost the consumer much more money than they would if purchased from first hands." What hampers our trade with other countries than Great Britain is the indirect routes that our goods take, owing to shipments in foreign bottoms, and the fact that our goods are by several middlemen whose combined profits are handled often more than those of the original producer. There is a vast trade in prospect between the United States and Eastern countries, but this awaits the development of our mercantile marine, which again depends on more favorable legislation than has yet been vouchsafed.

COST OF TRANSPORTATION ON RAILROADS.

Considerable care has been bestowed of late by railroad contemporaries to pointing out the reductions in the cost of transportation by railway, basing their representations on actual statistics. It is impossible to estimate the magnitude of the benefits which the reductions effected have conferred upon the interests of agriculture, mining and commerce. An interesting illustration of the public benefits which have been realized from the widely-extended advantages of cheap transportation afforded by railroads has been furnished in the fact, stated by a careful collater of statistics, that the freight charges for the movement from Chicago to Boston, a distance of one thousand miles, of one year's subsistence of grain and meat for an adult working amounts to but $1.25, which sum is only one day's wages of a common laborer, or half the daily wages of a good carpenter or mason. A striking corollary from this fact is, that the importance of distance and, therefore, of geographical position as a condition affecting the material interests of sections, of States, and of commercial and industrial towns and cities, has been greatly reduced by the facilities for transportation afforded on railroads. At the same time the current history of railroad transportation in this country clearly indicates that there are evils connected with it which affect injuriously the commercial and industrial interests of the country and the railroads themselves. Hence arises the demand for some sort of govermental intervention, either through the enforcement of specific provisions of law, or through the moral influence exerted by a well grounded apprehension of such intervention as the result of the scrutiny exercised by intelligent boards of railroad commissioners. In a war of rates it is the widely fluctuating freight charges, and the glaring discriminations between different localities and trade centers which damage the public interest, demoralizing trade itself. When the railroads act conjointly, through freight pools, it is found that they are able to effect large savings of expense through economies practiced in the handling of freight and the employment of cars, locomotives and train hands, but with such pooling there exists a temptation unduly to advance rates, though any advance is better than the absurdities and vicious tendencies of a railroad war with its irresponsible soliciting freight agents scattered in different parts of the country, and its ever recurring rumors of further cutting. Just now there is a truce between rival interests, and in the absence of frictional resistance the stocks of the trunk lines by which the harvest reaches the seaboard have advanced. The maintenance of the value of railroad property is an important factor contributing to the maintenance of general prosperity. Pooling may not be a sovereign remedy for railroad evils, but it is a convenient concentration of the rate-making power.

OUR FOREIGN COMMERCE.

We have received from the Bureau of Statistics the preliminary report on the foreign commerce of the United States for the fiscal year ending June 30th, 1882. It discloses a decline in the aggregate value of foreign commerce, as compared with the

previous fiscal year, of $108,164,862, caused by the reduction in the evports of domestic merchandise from $883,925,947 in the fiscal year of 1881 to $733,073,037 during the fiscal year of 1882. Meanwhile the imports increased from $642,664,628 to $724,623,317, and in consequence of this gain in imports, while the exports were rapidly declining, the excess of exports of merchandise over imports of merchandise was reduced from $250,712,718 during the fiscal year ended June 30th, 1881, to $25,727,856 during the last fiscal year. The total value of imports and exports of merchandise and specie, amounted to $1,566,859,456, as against $1,675,024,318 during the preceding fiscal year, showing a falling off of $108,164,182. The most serious item is the falling off of exports, of merchandise from $902,377,346 in 1881, to $750,351,173 in 1882, while the imports increased from $642,664,628 to $724,523,317. Exports of specie rose from $19,406,847 to $49,412,576, while imports declined from $110,575,497 to $42,472,390, thus converting an excess of imports over exports of $91,168,650 in 1881, to an excess of exports over imports of $6,940,186 in 1882.

BUSINESS AND THE CROPS.

There is an improvement in the general activity of business, which awaits the marketing of the wheat crop to receive an important stimulus. The interests of the trade are largely bound up with the coming crops. The week has witnessed a material improvement in commercial and mercantile circles. The almost assured large crops of small grains, with the prospect of a fair foreign demand for our products, leads to the anticipation of a good and active autumn business. The sharp decline of grain at the close of last month has continued to check receipts at western points of accumulation. One dollar a bushel for wheat at Chicago is not a high price, but it is one which in view of the large crop farmers would do well to accept. It is to be hoped that the experience of the past season will have taught our farmers the folly of holding back their wheat for higher prices than those which are handsomely remunerative until western Europe has been supplied from other sources. The world is not dependent on the American crop, but with reasonable rates our surplus can be marketed abroad. Again, grain should be moved while the water-ways are open to navigation, for there is little question that that portion of the crop which is laid down on the seaboard before navigation closes will realize the highest price to the producer. The prospects of the corn crop have somewhat improved, but there seems to be no good reason for anticipating that the total for the whole country will exceed much, if at all, the crop of 1881, or that the prices for corn and provisions will remain at high figures.

NEW ENGLAND MANUFACTURERS AND MECHANICS INSTITUTE.

This exhibition which is announced to open on September 6, will prove undoubtedly the most imposing yet held. The corporation which has organized the undertaking, and which owns the vast structure in which the exhibition is to be held, are nearly a thousand of the New England manufacturers, and many of the most prominent ones. This iron and glass building was built in 1881, and the exhibition of that year redounded to the honor of the New England States. That display will be largely surpassed the present year, for all the States of the Union have been invited to send contributions so as to render it thoroughly national. We trust that the enterprise of our manufacturers will lead to a large representation of the industries of Ohio on the occasion. New York and other cities are putting forth great efforts for a creditable exhibit, and those of Ohio should not be behind. We have made arrangements to secure descriptive details of machinery possessing new and special features of interest. Some idea of the capacity of the building will be afforded by the figures of its dimensions. The actual area of the ground floor is 207,654 square feet, or nearly five acres; the gallery and hall added to this make a total area of floor space within the building of 351,834 square feet, more than eight acres, all well lighted, ventilated and available for exhibition purposes. The total length of the building is 551½ feet, the width is 403 feet and four inches. Every convenience for visitors will be provided. The building will be lighted at night by no less than a thousand of the Edison incandescent lights. The attractions will include a fine art exhibit and display of the musical instruments of the leading manufacturers of New England. An excellent feature in the arrangements is that no awards of any kind are bestowed, but exhibitors are allowed to have competitive trials, arranging their own tests and appointing their own committees and appointing their own judges. The Boston and Providence Railroad Company have a spur track running through the center of the building, so that goods in bulk or by weight recceived at any of the railroads in Boston can be switched on and landed in the building without breaking bulk. All needed information will be readily supplied by the Treasurer, Mr. J. F. Wood, 38 Hawley street, Boston, Mass.

UTILIZING SLACK.

A series of interesting experiments have been made in the presence of the coal dealers of Cincinnati explanatory of an English process for the utilization of slack or small coal. The experiments were given under the supervision of the inventor, Mr. W. H. Cory, of Cardiff, Wales, where the process has been in operation since 1873. Thousands upon thousands of tons of coal slack and dust go to waste year after year, and the invention is calculated to stay this waste, and at a cost of manufacture of but 50 cents a ton. The process is as simple as can be, and consists of mixing the slack or dust coal with fire clay and silicate of soda (for bituminous coal 2 per cent. of clay and 3 per cent. of silicate), and subjecting the block to a pressure of one ton to the square inch of the block surface. The block thus formed is as hard as ordinary coal, and has all its angles rounded to prevent chipping, the surface being glazed by the manner in which the pressure is de livered, the press manufacturing 240 tons in twenty hours. The blocks require twenty-four hours to become hard and fit for use, as during that time the chemical action takes place, the clay converting the silicate of soda into silicate of alumina, thus turning a soluble into an insoluble, or, in other words, vivifying the block and causing it to be weather proof.

THE chief result of the meeting of the Chicago Convention of the Amalgamated Association of Iron and Steel Workers has been the passage of a resolution guaranteeing the manufacturers that the basis of the present sliding-scale on puddling and nailing would not be changed for four years, and a reorganization by which unity of action is assured, and which must tend to prevent flagrant breeches of faith. Heretofore, each district has met annually in its district convention and had its own base for the scale, without the sanction or interference of other districts. In future they will meet as they have done and suggest such alterations as they may deem necessary. Then they will proceed to elect delegates on the basis of one delegate for every 300 members of the association in the district. The delegates thus elected will meet at Pittsburgh in April, and discuss the suggestions offered by district conventions. In this body the majority rules, and when they have agreed upon what they think is right, a conference committee will be appointed to meet a like committee from the manufacturers and discuss the scale.

THE enormous extent of the lumber interest of this country is shown in the recently issued section of the census report of 1880. It appears that in that year there were no less than 25,708 establishments, with a capital of $181,186,122 and employing 147,956 hands, an army in itself. The value of logs was $139,836,869; of mill supplies, $6,318,516; wages paid during the year, $31,845,974. The amount produced was, lumber, 18,091,356,000 (board measure); laths, number, 1,761,788,000; shingles, number, 5,555,046,000; staves, number, 1,248,256,000; sets of headings, 146,523,000; spool and bobbin stock, 34,076,000 feet, and value of all other products $2,682,668. The total value of all products was $233,367,729. The rank by States according to value of products was for the first ten: 1st, Michigan; 2d, Pennsylvania; 3d, Wisconsin; 4th, New York; 5th, Indiana; 6th, Ohio; 8th, Minnesota, 9th, Iowa; 10th Missouri.

AN important experiment is about to be carried out in London, England, that of supplying hydraulic power in the neighborhood of the docks north and south of the Thames. A company organized for that purpose is empowered to lay all necessary pipes, and to take, for a nominal term of payment, 1,000,000 gallons of water from the Thames. The district thus secured contains a great number of wharves and warehouses, where hydraulic power can be well turned to account. It is also proposed to employ the hydraulic power to drive electric light machinery. It is intended at first to lay about ten miles of mains, and to erect hydraulic pumping engines of 500-horse power, provision being made for future extensions.

A HOLLOWAY mechanical labratory is proposed, one in which tests of all structural materials should be made, and various scientific investigations of interest to the mechanical world carried out. Chemistry now enters so largely into mechanics that experimental tests of existing formulæ might with advantage be carried on in such an institution. The scheme should receive the liberal support of all manufacturers.

MANUFACTURES.

TO MACHINISTS, MANUFACTURERS AND OTHERS.

THE publishers of THE TRADE REVIEW solicit items of information concerning manufacturing and other establishments in any part of the country, and all such items will be promptly inserted in these columns, free of charge. Facts are the only things needed; and all communications should be accompanied with the name of the contributor—not for publication—but as a guarantee of good faith.

Manufacturers, machinist and engineers are particularly requested to communicate any matters of interest relating to their specialties. No one need be deterred from sending any interesting facts in his own anguage, as all such contributions will be properly revised before sending to press.

OHIO INDUSTRIES.

THERE is, perhaps, no one establishment to which Akron is more indebted for the enviable and wide-spread reputation enjoyed, which stands more conspicuously before the public for the magnitude of its transactions, than that of the Akron Steam Forge Co., which has had an existence of over fifteen years. It was established by Messrs. Ford, Taplin & Co., but subsequently became an incorporated company, under the above title. The officers are: A. L. Conger, president; John McGregor, secretary and treasurer, and Charles Rawson superintendent, and all have had many years' experience in the business. The area of ground owned by the corporation is ten acres, and the ground occupied by the works is 60x290 feet. In the axle shop there are five heating furnaces and four steam hammers, one being an upright hammer, taking steam both ways, together with other improvements commended by thorough experience.

The product of these works comprises car, truck and driving axles, shafting and every description of forging used in railroad machine and bridge shops. The firm has an enviable reputation for making first-class goods, as none but the very best wrought, scrap, hammered material is used, and absolute perfection is aimed at and attained in all their manufactures. The quality, strength, finish and durability of these goods is acknowledged to be unsurpassed. They are doing a prosperous business, and their product is in active demand in all parts of the country, and especially in the West. They are turning out sixty car and locomotive axles per day, working day force alone, and giving employment to fifty experienced and skilled workmen. The shipping facilities of this company are all that need be desired, as they have switches connecting their yards with all the railroads passing through the city.

The Akron Pottery, E. H. Merrill & Co., proprietors, was established in 1843, and is the oldest pottery in Akron. The senior member of the firm is called the veteran potter of this region, he having been engaged in the business longer than any one else in this section. He is an enthusiast in the ceramic art, and has devoted a long life to its developments and improvements. He has made many improvements in machinery especially applicable to this branch of business, and has has patented all his own specialties. The firm has invented an improvement in clay mills, which greatly facilitates the manufacture of their specialties. Their leading specialties are stone beer and ink bottles, and smoking of the latter article. They manufactured over two and a quarter millions the past year. Their stone bottles are made from the superior vitrious or glass clay of this locality, will not absorb moisture, and are equal in quality to the Arnold bottle. The demand for products of this house extends to all parts of the country, but particularly to the West. The buildings occupied by this firm cover an area of 200x150 feet and are equipped with all the latest improved machinery. They are now building two new clay mills, and, on an average, thirty-five hands are given steady employment. The house has been under its present management for the past two years. Mr. F. W. Butler has charge of the financial department, and E. H. Merrill takes charge of the manufacturing department, giving his attention and skill to the business. The ample measure of success attendant upon the efforts of this house has been largely due to the enterprising, honorable and skilful management of Mr. E. H. Merrill, who bas had over fifty years' experience in the business.

The Union Flint Glass Co., Martins Ferry, the organization of which we have mentioned, has purchased the old Swartz Agricultural Works. The buildings were enlarged and improved, and additions were erected. The works front on First street and extend a distance of 200 feet, running back to the river, an average distance of about 60 feet. The main building is of brick, two stories high and 73 feet long. On the lower floor are the packing room, ware room, mold shop, blacksmith shop and engine room. On the second floor are the cutting, engraving and etching rooms, sample room and office. The factory building is an entirely new and very substantial frame structure 55 feet square. It has a ten-pot furnace, with all the necessary fixtures and belongings, and is well lighted on three sides. Old glass men declare it to be one of the finest factories in this region. Between the main building and the factory is the lear room, mixing room and cutting-off room, a building 72 feet in length by 40 in width, another new and substantial frame structure. The works will give employment to about 100 hands, which number will probably be enlarged as soon as their business develops. The works will manufacture the usual line of general table ware and bar goods, but propose making a specialty of light blown ware, technicaly known as "bubble ware," such as tumblers, goblets, etc. This line of goods is in great demand just now, and the probabilities are that the Union Glass Co. will do an excellent trade in their specialty.

The Cope & Maxwell Manufacturing Co., of Hamilton, are at present engaged upon a pair of pumping engines of the tandem compound condensing separate acting type, with a capacity of 1,000,000 gallons in 24 hours, to be used at the Soldier's Home, Dayton. The water from these engines is to be delivered into a stand pipe 25 feet in diameter at the bottom, 18 feet in diameter at the top, and 132 feet high, through a 10 inch force main. Each engine has its own air pumps and condenser, and is governed in its movements by the patent hydraulic regulator made by this company. This device confines the piston travel of the engine to the speed which the regulator is set under any condition of service. If the pumps should lose their load by accident to the street mains or other connections, or from a failure of the supply of water from any cause, no harm can come to the pumps or engines. By this means the valve movement is under perfect control, and has as easy and steady a movement as if moved by an eccentric. The pumps can be operated separately or together, as the requirements of service demand. They may be used as duplex machines, each one actuating the other's auxiliary valve, or they may be operated separately, each actuating its own auxiliary valve thus serving as two independent machines.

The firm of Knapp & Whitsell, manufacturers of Ohio stoneware, Akron, was established ten years ago by F. J. Knapp, and Mr. James Whitsell was admitted into partnership on the 16th of December, 1881. The main building is 60x160 feet, two stories in height, and a warehouse 50x80 feet. They are supplied with all necessary machinery and appliances of the most perfect construction, especially adapted to this line of business. Two kilns are used, with a capacity of 15,000 gallons per week. They manufacture a superior quality of goods, and the demand for them extends in all directions. The clay used is of the very best material and peculiarly adapted to the manufacture of this class of goods. Mr. Knapp has had twenty-five years' experience in the business, and is the general agent of the firm. Mr. Whitsell has charge of the works, and has fifteen years' practical experience in the pottery business. They are both honorable and enterprising business men, and practically familiar with all the details of the business in which they are engaged.

The new table glassware manufactory of Stoehr, Keech & Co., at Massillon, commenced operation on August 3. They have two large Belgian smoke-consuming furnaces, and the latest improvements in molds, presses and machinery. The factory building is 70x100 feet, and contains for motive power one 20-horse-power engine; also a No. 8 Sturtevant blower. Seventy-five men are employed here. They manufacture flint table glassware, in opal, pink, amber, blue or any other color desired, also seed cups, bird baths, etc. They have ready quite a large line of novelties, considering the short time they have been in operation, which they will place on the market at an early date. They intend to dispose of their products in the West Indies and South America, as well as in the United States and Canada. The officers are: L. Stoehr, general superintendent; W. H. Keech, secretary and treasurer; D. H. Stoehr, general salesman.—*Amer. Pottery and Glassware Reporter.*

Brush's secondary batteries are already in process of manufacture by the Brush Electric Light Co., Cleveland, and will be introduced in connection with the Swan incandescent lights and put on the market in the next two months. The new apparatus will be first given to those who are using the Brush machines. The agency of the Brush Electric Co. in this city, mentioned below, has applications on file from numerous steamers, now using arc lights, for reservoirs and incandescent lights for use in their cabins, engine rooms, etc. The arc light is used for large rooms, halls, outdoors, parks, etc., and the Swan incandescent light is intended to take the place of gas, and is more easily controlled, less dangerous, and cheaper. With a storage reservoir, one's house can be lighted, and with the help of an electric motor, much of the labor incident to the household economy, such as running a sewing machine, operating dumb waiters, coal hoists, burglar alarms, etc., can be performed.

The new kiln of J. C. Ewart & Co., Drain Roofing Tile Works, Akron, is the largest in Summit county, being 22 feet in diameter, inside measurement, and has a capacity for holding 45,000 small tile at one time. The kiln is built of the best quality of fire brick and is constructed on the down-draft principle. The manufacturing facilities to supply the new kiln will be increased by the addition of a new press for the making of roofing tile and a new press for drain tile. An addition, 24x40 feet in dimension, has also been added to the building and will be used as a dry shed, with a capacity for holding and drying at one time 60,000 small sized tile. The force of men in the shop has been increased from 13 to 18, and the machinery is now being run from 12 to 14 hours per day. The trade of the shop extends well over the United States, orders for large contracts now being on file from parties in the following named cities: Albany, New York, public building, 110,000 shingle tiles, covering 23,000 square foot of roof; Topeka, Kansas; Philadelphia, Pa.; Cincinnati; Washington; Hartford, Conn.; Boston; Denver, Col., and Indianapolis. The trade of this establishment has been growing very rapidly, it being but a few years, comparatively speaking, since the shop was started, and now is doing not only a large but profitable business.

The Standard Iron Co., of Bridgeport, are getting along fast with their new mill. This company was organized last January, with $200,000 capital, the directors being Messrs. L. Spencer, W. W. Holloway, L. S. Delaplaine, Alonzo Loring, A. P. Tallman, J. R. Mitchell aud D. C. List, Jr. The company purchased land about the middle of March and immediately commenced operations. The foundations are now ready for the buildings, which will be of iron, and they will be erected in about a month. The machinery is now being made in Pittsburgh and will be placed as soon as the buildings are erected. There will be two trains of rolls for turning out sheet iron, and eight boiling furnaces. An excellent coal bank is connected with the mill. The whole establishment is expected to be in running order by November 1.

The Queen City Machine Works, the name of a new establishment for the manufacture of lathes pulleys and machinists' tools of a new and improved designs is flourishing, Messrs. Reinshagen & Buckman are the proprietors. They are making the Monitor or Turret lathe one of their specialties. It is designed expressly to be used for the manufacture of brass goods, and for the tapping of globe valves, &c. They have shipped quite a number of these lathes to Eastern States, and are engaged at present on a number of orders for Eastern and Western machinists and manufacturers of brass goods.

A Correspondent of the *Northwestern Lumberman*, writing from Ironton, says: There are two mills in this city and a number along the Ohio at Ashland, Portsmouth, Catlettsburg, and at other points on the timber streams. Newman & Rodarmor's mill has a capacity of 25,000 feet daily. Newman & Spanner's has a capacity of 8,000 feet daily. Both these mills have been and are cutting as fast as they can and have large stocks of logs in the river that must be cut before the cold weather, as they are liable to be frozen up in the river, and would then have to be cut out of the ice or be suffered to go down the stream when the break-up comes.

It is believed that when completed the mill of Sumner Bros. & Co., at Struthers, will be one of the finest sheet mills in the country. The owners are are all practical sheet iron rollers and know exactly what is desired to make a first class quality of iron. It is probable that next week one of the mills will be finished and put in operation. The inquries already received from customers indicate that they will do a good business.

The Beacon has come in possession of the information, though not officially, that several Akron capitalists contemplate the erection of a large oat meal mill and commercial mill on the Stewart estate, the property recently purchased by the Akron Strawboard Co., fronting on East Market street, Sixth ward. If such is the case, it will now be understood why there was such a sharp contest for that land.

The Watt Mining Car Wheel Co., Barnesville, have taken advantage of the dull season and put an addition of 20x110 feet to their works to be used as a pattern shop and also for building coal cars. New machinery has been put in for manufacturing Watt's patent self-oiling car wheel.

Wm. Resor & Co., Cincinnati, have just completed one of the most complete stove works in the country. Their foundry covers an area of 40,000 square feet and their warehouse 14,000 square feet. They have now 225 hands employed, which will be increased to about 350.

The new shops of the Cleveland, Akron & Columbus road in Mt. Vernon, opened on August 13,

with a promenade concert and grand hop. The Barracks orchestra, Columbus, was engaged for the occasion, and special trains were run from Akron & Columbus to accommodate the invited guests, who numbered one thousand.

THE dimensions of the buildings of the Bartlett Iron and Steel Works Vermillion, to be shortly erected, will be 60x100 feet. The capital of the company is $500,000. Several hundred men will be employed.

THE Standard Oil Company have placed an order with Sharpe & Daniels, operating the rolling mill at Alikanna, for twenty tons of hoop iron a day, for fifteen months, from July 10, 1882.

THE Western Automatic Machine Screw Co., Elyria, manufacturers of set and cap screws, and hand and machine taps, are building additions 70x22 for office and storeroom, 64x35, two stories, for machine shop, to be fitted with new machinery.

THE Vulcan Iron Works, Toledo, are building a new boiler shop 100x80, to be fitted with improved machinery, including a power riveter.

THE Globe Iron Works, Cleveland, are increasing their capacity by erecting a three story brick building 120x101.

WEEKS, COOK & WEEKS, Akron, have purchased ten acres of very desirable land on the Valley Railway for their new pottery. The company have placed an order with the Webster, Camp & Lane Machine Co., for a 45-ton engine.

THE Morse Bridge Works, Youngstown, have a large order for bridge girders for the Pittsburgh, McKeesport & Youngstown Railway. Ground is being broken for an extension of the Morse works.

THE Niles Tool Works, Hamilton, have received an order from Scotland for a large number of tools, including drills, drill presses, hydrostatic wheel press, etc.

THE H. H. Thorp Manufacturing Co., Cleveland, has been incorporated for the manufacture of printing presses, printers' materials; nominal capital, $100,000.

J. CHATTERTON & Co., Cleveland, have built a new shop 80x30, and filled it with improved tools for the manufacture of steam boilers.

ONE of the new furnaces at Cuyahoga Falls has been started, and the other will soon be in readiness.

NEW nail works are proposed for Brilliant, Jefferson Co.

OLIVE Furnace has been blown in and is doing well.

INDUSTRIES IN GENERAL.

NEW HAMPSHIRE.

THE Swamscott Machine Works, at South Newmarket are very busy, and one day recently about 70 tons of manufactured goods, including five steel boilers and a carload of boiler fronts, were shipped from the works.

CONNECTICUT.

THE officers of the Wilson Sewing Machine Co., have made proposals to the citizens of New Britain to locate the company's work-shops in that place Stock to the amount of $250,000 is asked to be subscribed for.

A manufacturing company has been organized at New London, to be known as the Babcock Printing Press Manufacturing Co. They will build drum cylinder, stop cylinder and lithographic presses.

AT Ansonia copper telegreph wire is being made on a large scale. Here is the largest electro-plating establishment in the world. A 300 horse-power engine is driving twenty-five huge dynamo machines which are sending electrical currents into 152 vats containing a solution of blue vitriol, many hundred weight of pure copper and about seventy-five miles of wire in process of electro-plating. Two additional engines each of 300 horse-power, are in process of erection and an acre or more of floor-room is waiting to receive the plant with which it is proposed to increase the product of the factory from eight miles of wire a day to thirty miles a day. This wire consists of a steel core surrounded with pure copper. From the steel core the required tensile strength is obtained; from the copper the extraordinary conducting power, which, it is claimed, will reduce the electrical resistance to a minimum practically, and not only enable the company to use automatic apparatus in sending and receiving, but will bring San Francisco telegraphically nearer New York than Chicago is now. For the large wire now making for the through lines to Chicago which the company has under contract, 500 pounds of copper are used on each mile.

RHODE ISLAND.

THE Diamond Emery Wheel & Machine Co., of Providence, have recently secured to them Letters Patent dated August 1, 1882, covering all their inventions and improvements in Emery Wheel Machinery. Their production in this line is rapidly increasing. They have added more room and new tools to their works and now occupy a floor space of 10,000 square feet filled with new and expensive machinery. New tools are being added with other new inventions of theirs in progress, which in emery wheel machinery cannot fail to secure the largest trade throughout the conntry. Their facilities for production afford them an immense advantage both as to quality of goods and price, as well as prompt execution of orders. In all the principal cities of the Union their machinery and tools are to be found in the stock of leading dealers in their line. We may mention incidentally that Mr. W. H. Packer & Co., Cleveland, are making a specialty of their goods.

PENNSYLVANIA.

THE Meadville Glass Co. has started up and promises to be a big success.

THE plan upon which the works of the Scranton Steel Co., are being constructed, to be completed next fall, is a combination of the best plans to be found at similar establishments in Germany, Belgium and England. President Scranton and his chief engineer have been abroad nearly a year visiting the principal steel mills and taking notes of the leading improvements before beginning operations.

A NEW concern styled Marland, Neely & Co., Pittsburg, are erecting works for the manufacture of bolts, nuts, rivets, washers and special shapes. They will be in opperation by September 1.

CAVETT & MCKNIGHT, of the Anchor Foundry and Machine Works, have just completed a 70-ton vertical shear for the Pittsburg Steel Casting Company. This is probably the largest vertical shear in the United States. They are now finishing a 32x5 engine for the Apollo Iron Works, and a flywheel of 25 feet diameter and forty tons weight for the same works. They are running their works to full capacity, and giving employment to sixty men. Their specialty is rolling mill and steamboat work.

ILLINOIS.

THE Iron Age Malleable Hardware Co. is the title of a newly incorporated company of St. Charles, the capital stock of which is $50,000.

THE Western Electric Mfg. Co., Chicago, are putting additional machinery in their works, and are employing 175 men.

PLANS for the establishment of a watch factory at Bloomington are being matured. It is proposed to organize a company with a capital stock of $150,000.

THE Chicago Malleable Iron Co. have increased their capital from $200,000 to $300,000.

TENNESSEE.

THE census returns show the number of furnaces rolling mills, steel works, forges and bloomeries in this State to be forty-three, with an aggregate capital of $3,681,776, employing 4,095 hands.

CORRESPONDENCE.

FROM OUR SPECIAL TRAVELING CORRESPONDENTS.

BRIDGEPORT, CON., August 16.

The population of Bridgeport is 33,000. It is distant from New York 56 miles. In addition to good railway facilities, it has two lines of steamers running daily between it and New York city. I append notes taken of visits to its manufactories, remarking that business appears to be generally thriving.——The Bridgeport Spring Company, manufacturers of fine carriage springs and axles, East Washington Ave., have 100 hands in their works. They have been established twenty-five years, and are doing this year a larger trade than last. Mr. W. H. Rockwell is secretary and Mr. Edwin Banks treasurer.——At the Bridgeport Machine Tool Works, E. P. Bullard, proprietor, has been producing for the past two years an important specialty in a 16 inch engine lathe. The success of the venture has warranted Mr. Bullard purchasing the works which were erected in 1875 and 1876 by the Bridgeport Lock Co., and he is now erecting additional buildings and making arrangements to increase the business with a view of making other sizes of lathes as the market demands. He has turned out up to this present time 180 lathes from the 20th of April 1881, the time the first shipment was made from the shop.——The Eaton, Cole & Burnham Co.'s factory was established 1873. The company employ 400 hands. Shipments are made principally to the Southern and Western States. Trade is much better this season than last. Prospects are very good. Shipments are also made to Eastern States and Canada.——The Pacific Iron Works, the proprietors of which are P. H. Skidmore & Sons, corner East Washington Ave. and Water St., were established in 1852, and employ 110 hands. Shipments are principally to New York city.——The Belknap Mfg. Co., makers of brass, steam, gas and water goods, 199 Water St., employ 100 hands. Trade compares well with last year. A leading specialty is steam goods. They have a salesroom at 62 Gold St., New York city.——An inspection of Mr. F. Armstrong's adjustable stock and dies for pipe and bolts which were patented April 6, '75 and October 8, '78, must satisfy every mechanic of their excellence. These dies are acceptable substitutes for the old style stock and solid dies, ond are in every sense reliable. They are substantial, strong and accurate and easily adjustable to all variations in size of fittings. Mr. Armstrong employs 50 hands and has been established in business three years. Trade is reported good He ships all over the Union and has a large export trade.——I have been much pleased with a visit to the Bridgeport Boiler Works, of which Messrs. Lowe & Watson are proprietors. Here are turned out stationery and marine boilers, house heating boilers and Lowe's patent tubular and flue boilers, superheating steam drum and fuel economizer. Orders for the firm's boilers and heaters are very heavy. I notice that the firm adopt the Connery patent concave system of caulking on all the boilers they make; I understand that it prevents injurious nicking of the plates.——Mr. Jerome B. Secor, manufacturer of the Secor sewing machine, corner Broad St. and Railroad Ave., employs on an average 50 hands. His shipments are made to New York. He is very fully occupied on gun and sewing machine tools, and turns out various ingenious mechanical toys. Fine mechanical work is done to order.——I must mention with commendation the Atlantic Hotel of which Mr. Peter Foland is proprietor. He has run it about two years. It is regarded both as to accommodation and the table at which every thing in season, as best hotel in this section of the State. Mr. H. A. Terrel is book-keeper and Mr. W. Foland, clerk.

ELMIRA, N. Y., Aug. 17.

The Davis Wrought Iron Wagon Co, reorganized January 1st 1882, with a capital of $150,000, and introduced an improved patent machine for the manufacture of wagons. Trade has been thriving. They have just received an order for 200 wagons for the California trade. Their wagons will stand all kind of weather, hot or cold, wet or dry. They employ 30 hands at the present time. Their capacity is 25 wagons a weck. Mr. S. T. Reynolds is pres't and sec'y, Mr. Jno. Arnot, Jr., vice-pres't and treas., and Mr. R. D. Ferris, manager.——The LaFrance Fire Engine Co., manufacturers of rotary steam fire engines and Hayes' extension ladder truck and fire escape, was established two and a half years ago. They employ 80 hands. Shipments are made principally to the Southern States; they also have a good Eastern and Western trade. They report trade the past season as very good. Prospects at the present time are excellent. Mr. Geo. M. Diven is president; Mr. John T. Rathbun, vice president, Mr. Engene Diven, Sec'y aud treas. and Mr. Alex Diven, superintendent.——A Wyckoff, manufacturer of wooden water pipe, pump tubing and square pipe, 120 and 122 Railroad Ave. near Water St., employs 25 hands. He ships to Pennsylvania, New York and New Jersey. Trade of late has been somewhat dull. The pipe is made under his own patent, banded with iron and coated with asphaltum, making it very strong and durable.

ITEMS OF INTEREST.

THE revenues of Mexico in the last fiscal year amounted to $27,500,000.

ABOUT 18,500,000 tons of iron ore of all kinds are now annually used in the United Kingdom.

IRON in a mechanically hard condition can receive more magnetism than in a soft condition.

MESSRS. H. DISSTON & SONS, the celebrated saw manufacturers of Philadelphia, are about to erect extensive works in Canada.

FOUR hundred million dollars in round figures will be the receipts of the Government this year. In 1878 there were two hundred and fifty-seven millions.

NEARLY 10,000,000 gallons of wine are produced in California yearly, and it is growing in esteem at home and abroad. In the direction of fruit raising and canning this State also finds valuable industries.

THERE are grain men in New York who estimate the wheat crop of 1882 at 30,000,000 bushels. The grain crop of this year will not fall short of 500,000,000 bushels, and may go 20,000,000 better. 300,000,000 bushels would have been a sorry crop.

THE product of the California quicksilver mines for the six months of the year is placed at 22,700 flasks, of which quantity 18,435 flasks, valued at $539,070, has been exported, two-thirds of it going to China and Hong Kong. New York took only 800 flasks, valued at $25,000.

AN iron chess-board, provided with magnetic chessman, is a Berlin novelty. The small magnets concealed in the figures cause them to adhere to the iron board, and retain their places in spite of considerable shocks, such, for instance, as are received on shipboard or railroad trains.

M. De Le Luyener has presented a report to the Societe d' Encouragement upon the experiments of photography on hard faience by M. Cacault, at Colombes. The photographs were taken upon the fine hard faience of Creil; they are baked upon enamel at a single heat, in a temperature about equivalent to that of boiling varnish.

WE have received a copy of the Spectator of St. Louis, a most able and entertaining weekly journal dealing with topics of the day and replete with literary entertainment of a high order of merit. It contains a long letter of interest to Clevelanders, on the general features of the Forest city, and taking note of various city organizations.

Two exceedingly large specimens of weighing machinery have recently been completed by Messrs. Henry Pooley & Son, of Liverpool, England. They each have a weighing capacity of 80 tons, and are said to be very sensitive. When recently tested it was found that with a load of 40 tons the addition of a single pound turned the scale. The total weight of the machinery is about 30 tons.

A CALL has been issued to the Eastern bar and plate iron manufacturers to meet at Manhattan Beach,, on the 24th inst., to consider the proposed Tariff revision, and agree upon a schedule to be submitted to the National Convention to be held at Cresson, September 12th, as meeting the views of a majority of the Eastern manufacturers. The Western bar and plate manufacturers will also be represented on that occasion.

COMPOUND armor plates— iron faced with steel —will very probably be adopted by the French Government for new men-of-war. The steel resists penetration, and the iron backing gives the desired tenacity. Steel alone when struck fractures and falls to pieces. Heavy shot easily passes through a considerable thickness of iron. Iron and steel combined make a surprisingly strong resistance to projectiles.

GUN cotton charges for the destruction of an enemy's guns have only recently been introduced into the Royal navy. They are generally discs of one half pound each, with a hole in the centre for the detonation, without which they cannot be fired. Half a dozen or so of these slabs are placed upon or in the muzzle of the gun are fired either by electricity or a Bickford's fuse, the latter being handier in a cutting out or spiking expedition, and the gun is rendered useless.

THE best and most spirited examples of good treatment of natural forms are, perhaps, to be found among the art works of the Japanese, lately so deservedly popular. The artists of Japan are able, by a very few masterly touches, to make a better and more truthful representation of a plant than most other artists can do, even with "labor infinite"—a representation which perfectly expresses life, growth and character. Their decorations are also almost always well chosen and appropriately placed.

THE nomination of Gen. Grant to negotiate a commercial treaty with Mexico is regarded as a fine stroke of diplomacy. The gradual completion of the railroad from Mexico and the United States towards the Rio Grande renders the negotiation of such a treaty of extreme importance. It is believed that the American and Mexican railway systems will be united within the next 18 months, and to reap the benefits of such a close union of the two republics a revision of treaty relations is indispensable. It is expected that an immense market will thus be opened for American machinery and other manufactures. It was stated at the executive mansion that Gen. Grant's popularity in Mexico would enable him to accomplish more than any other American who could be sent there.

MECHANICAL RECEIPTS AND ITEMS

Coppering Cast Iron.

In coppering cast-iron M. Wail uses a bath of copper sulphate rendered strongly alkaline with an organic acid, added to prevent the precipitation of copper oxide. To effect the same object, MM. Mignon and Rouatt employ a distinctly acid solution of a double salt of copper and any alkali with an organic acid.

Welding Cast Steel.

Baryta (barium oxide) is often employed for welding cast steel or Bessemer scrap. The pieces are covered with a little baryta, and are made into piles in the usual way. These are treated in an ordinary reverbatory furnace. When the steel begins to melt baryta is gradually added until it permeates the whole pile. After the pile is sufficiently softened the ball is brought under a steam hammer, and with repeated additions of the flux is carefully pressed and hammered.

Hardening Metals.

Metals, and especially steel, brought to a cherry-red heat and strongly compressed, the pressure being continued until the mass is perfectly cold, are said to acquire an excessive hardness, and a striking fineness of grain. Steel thus treated acquires a coercitive force, which enables it to become magnetic. The durability of this property requires to be studied.

Rubber Packing.

Rubber packing may be made steam and air-tight by being brushed over with a solution of powdered resin in ten times its weight of strong water of ammonia. At first this solution is a viscid, sticky mass, which, however, after three or four weeks becomes thinner and fit for use. The liquid sticks easily to rubber, as well as to wood and metal. It hardens as soon as the ammonia evaporates, and becomes perfectly impervious to liquids.

To Cover Metals with Tin.

To cover metals with a layer of tin by an immersion process, they are dipped, after being well cleaned, in a boiling bath, containing ammoniacal alum, 535 parts: water, 870 parts; proto-chloride of tin, 31 parts. Another bath for tinning is the following: Bitartrate of potash, 435 parts; water, 870 parts; proto-chloride of tin 31 parts. To cover metals with a layer of tin by means of electricity the following bath is prepared: Pyrophosphate of potash, 400 parts; proto-chlorate of tin, 150 parts; water, 560 parts. The anode is an ingot of pure tin (Banca); the negative is a zinc ingot. Weigler gives the following method: A bath is prepared by leading chlorine through a concentrated solution of chloride of tin until saturated. The excess of chlorine is then driven away by heating the solution after adding to it ten times its volume of water and filtering. The pieces which have to be tinned are cleaned in dilute acid, polished with fine sand, washed, and then, suspended to zinc wire, are left for ten or fifteen minutes in the galvanizing bath. This method has the disadvantage that the bath becomes charged with chloride of zinc very soon, and that the tin salt must be often added. Hern proposes the following bath: Tartaric acid, 62 parts; water, 3,000 parts; soda, 90 parts; protochloride of tin, 90 parts. The operation is a little longer than by Weigler's process.

USEFUL RECEIPTS.

TO MAKE BLACK ANILINE INK.—Dissolve five parts nigrosin in 100 parts water, and if the solution is very blue add a few drops of an aqueous solution of Bismarck brown. With the addition of five per cent. glycerine it becomes a copying ink.

CEMENT FOR CASTINGS.—A good cement for filling faults in casting is made as follows: Iron filings, free from rust, 10 parts; sulphur, ½; sal-ammoniac, 0.8. These are mixed with water to a thick paste, which is rammed into the "faults." This becomes strong when the iron filings are rusted. The parts which have to be cemented are treated before the operation with liquid ammonia, so as to be perfectly free from grease.

VENTILATING APARTMENTS.—The Barber patent heating and ventilating apparatus, manufactured at Washington, D. C., has become quite popular with scientific men who have looked into its *modus operandi*. In its action it combats the popular theory of ventilation at the top of the room; acting on the theory that heated air, rising when pure, sinks to the lowest part of the room when vitiated, and if then removed the foul air of the room is removed and real ventilation effected. The Barber apparatus is adopted in some of the scientific institutions of the East, with highly satisfactory results.

TO SILVER GLASS.—Drayton's method is to employ a silvering fluid made of nitrate of silver, ammonia and an alcoholic solution of the oil of cassia. This is poured on the glass, and a reducing fluid of alcohol and oil of cloves applied. This causes a separation of the silver, which deposits itself upon the glass. Nohl's method of silvering the interior of globes is to cause a precipitation of nitrate of silver by the use of a solution of gun cotton dissolved in hot caustic potash. Steinheil uses nitrate of silver, caustic ammonia, caustic soda, milk, sugar and water. The deposit is pure silver. Thomson's method, used mostly for silvering the inside of globes and bottles, deposits from an oxide or salt of silver. Martin's process is quite similar to the last mentioned. Some looking-glasses have a dark varnish or coating at the back. These reflect only a small portion of the light. M. Salvetat has announced to the Society of Encouragement, in Paris, a process of preparing looking-glasses, in which tin foil is replaced by platinum applied in a metallic and brilliant powder. The glass, having been carefully cleaned and polished, is covered, by means of a brush, with a mixture of chloride of platinum, essence of lavender, and a composition of litharge and borate of lead. When dry, the glass is placed in muffles, and the essence being volatilized leaves a deposit.

PROTECTION OF INFLAMMABLE SUBSTANCES.—MM. Martin and Tisser, of Paris, have lately introduced a solution for protecting all kinds of inflammable substances, woven and other fabrics, cotton, paper, &c. The composition consists chiefly of sulphate of ammonia, pure, 8 parts; boracic acid, 3 parts; borax, 1-7 parts, water, 100 parts. The solution is placed in a vat (120o Fahr.) New made paper, when it leaves the machine, is passed through the solution in the vat so as to be completely impregnated with it; but printed or any paper can be immersed in it, spread out to dry, and afterwards pressed to restore the glaze. An anti-inflammable mode of making paper consists of mixing one-third of ground asbestos fiber with two-thirds of paper waste, in a solution of salt and alum. The paper is passed through the finishing rolls after being plunged into a bath of dissolved gum lac. The salt and alum increase the strength of the paper and its resistance to fire; the lac also renders it impenetrable to moisture. A very simple application, which can be made by a brush. like paint, is given for theatrical scenery, furniture, &c. It consists of boracic acid, 5 parts; hydrochlorate of ammonia or sal-ammoniac, 15 parts; size, 5 parts; water, 100 parts, in which is added a sufficient quantity of calcareous substance to give it a body. Many other good preparations have been invented for the same object, and the patents of many of them have expired owing to the slight encouragement the inventors have received. A simple preparation, which can be applied by a brush, is obviously of greater value for timber and woodwork than the solutions for injection or impregnation—a process which is only applicable for small and movable objects, such as furniture and works of art.

PRACTICAL MECHANICS.

Processes of Tinning.

Tin, though of no great practical use by itself, is admirably adapted for coating other metals and protecting them against the evil effects of oxidation. The four principal methods of plating, says Iron, are by the contact of molten tin with a scaled surface, by amalgamation, by immersion, and by the galvanic battery. In the first process, which is that more generally employed, the metal, well scaled with diluted sulphuric or hydrochloric acid, is raised to the temperature of the melting point of tin. It is then sprinkled with powdered rosin for preventing oxidation. Great skill is required in this operation, which succeeds equally well with iron, brass and copper. In the process of amalgamation, which is rapidly falling into disuse, a thin layer of a soft amalgam of tin with mercury is applied to the perfectly clean and dry surface to be covered; on heating, the mercury is driven off and the tin adheres. In tinning by immersion, the parts to be tinned, well cleaned, are plunged into one of the following liquors, raised to boiling point:

Ammoniacal alum	535		Bitartrate of potash	435	
Boiling water	4600	or	Water	870	
Protochlorate of tin	31		Protochlorite of tin	31	

In the latter case, an ingot of pure zinc is immersed in the bath at the same time. In tinning with the battery, the following bath is prepared: Protochlorate of potash, 400 parts; proctochlorate of tin, 150 parts; water, 650 parts. At the positive pole is an ingot of pure Banca tin, and at the negative an ingot of zinc. The following method has been recommended by Weigler: A bath is prepared by introducing chlorine into a concentrated solution of chlorate of tin until it is saturated with this gas. The excess of chlorine is driven off by heating the solution, diluted with ten times its volume of filtered water. The articles to be tinned, scaled with dilute acid. polished with fine sand and rinsed, are suspended with zinc wires in the bath, connected with the battery, for 10 or 15 minutes. The disadvantages of this process are that the bath soon becomes charged with chlorate of zinc, and the tin salt requires frequent renewal. Hern proposes the following bath, in which the metals to be coated are to be immersed: Tartaric acid, 62 grams. (2 oz. 3 dr.); water, 3 liters (2¼ quarts); soda, 90 grms. (3 oz. 3 dr.); protochlorate of tin, 90 grms. (3 oz. 3 dr.)

Loam Moulding.

In building a loam-mould, of whatever construction, two important things ought to be borne in mind by the moulder; first, the mould must be built so that it may require as little drying as possible; second, a uniform or regular thickness of loam must be kept on the face of the bricks next the casting, which loam is never to be more than three-quarters of an inch in thickness. If the moulder, builds against a pattern, and uses an extra quantity of loam to bed the bricks, each brick laid presses out the one laid previously; the second course presses out some of the bricks of the first, as they have not stiffened properly in their places, and when the pattern is drawn the surface of the mould will be found to be covered with hollows. Again, if a mould is made without a pattern, the formation of the mould being made with a board cut to the desired shape, and the bricks having in many places to be kept back from the edge of the board, say two inches, such a mould will be full of cracks, and we have already shown what cracks in the loam do to the casting; besides, the moulder has to wait till the first coating of loam is stiff before he can put on the fine loam to finish with, and when the loam is irregularly built time is wasted in waiting. In irregular building it is just as likely that some parts of the mould may have too little loam on the face of the bricks, and this is a more serious evil than an excess.

When metal falls from a height into a large mould, and some of the bricks on the face of the mould have but little loam, scrabbing is sure to follow, unless it is extraordinarily good. When metal is to fall upon the bed or face of a mould the loam covering the bricks ought to be regular. Where there is a sheet of good loam, three-quarters or seven-eights of an inch thick, properly dried and cast while it retains a little of its heat, it is impossible for a scab to be produced on the casting. The sides of a mould are less liable to scab from irregular building than the bottom or face, but veins are produced. The mould should be built regularly on the outside as well as the inside, the building plates or rings not to be further projecting than the brick-work, and care to be taken that all vent-pipes and fastenings for cores are not flush with the building, as they may inadvertently be made loose in being struck with a rammer whilst the mould is being rammed or when the mould is not rammed they are liable to accidents.

Loam-moulding is singularly adapted to all kinds of cylindrical bodies, as under this method the mould can be swept up with a board cut exactly as the outside formation of the casting requires. This board is fixed upon an arm coming from an upright bar, termed a "spindle." Two or more arms as the case may be, may be put on the spindle, which revolves in a cast iron socket, and the arms (sometimes called "shear-irons") are made to slide up or down the spindle. The mould when large is built in a pit, and having upon it a bush the proper size of the spindle, which is usually three inches in diameter, for the purpose of keeping the top of the spindle steady.

As to the process of finishing the mould All loam-moulds or cores made from a board are, after being built up, what is termed "roughed up"; that it, the loam is put upon the face of the bricks, and the board is worked backwards and forwards until the whole mould has been covered with loam. When iron-sand loam is used it is rough work indeed. After standing some time, and when the board has been made perfectly clean, the loam is "skinned up." When skinned up with iron sand, or the rough loam already spoken of, the sand is sometimes riddled fine before it is passed into the mill, or the rough-made loam may be passed through a fine riddle, many foundries preferring the latter plan to the former. When the mould is made with certain loams it is so fine of itself that an extraordinarily fine surface can be brought on the face of the core or mould merely by making the loam soft with water. The board has a beveled edge, and is kept going one way, the bevel leading. A mould or cores if not of iron-sand loam are always finished when still green, with steel tools; loam is easily finished, as great liberty may be taken with it. After being dried it receives its finishing touches by being rubbed all over with a fine card, when it may be considered ready for the black-wash. It is very difficult to sleek this, on the loam, as it has an inclination to stick to the tools. Many foundries do not sleek their moulds, merely rubbing the blacking parts gently with the hand, or coming over the part with a soft dry brush.

Iron-sand loam is finished after being dried, but is liable to scab when it is burnt. When it has not been skinned up with a board it has to be rubbed all over with coarse carding, then finished with water, fine loam, and finishing-sticks made to suit the different parts of the mould. This is termed "dressing the mould." It takes a long time in many instances, and sometimes much mischief occurs to the casting from imperfect dressing, and the less that a mould receives of the dressing-stick the better; hence the greater need for moulds being swept with a board instead of being built against a pattern, as dressing is not required when a board has been used. The mould being dressed and cold is now ready for the black-wash, and, steel or cast-iron tools to sleek the blacking can be used upon it with almost absolute impunity. The loam-mould bears the same relation to the dry-sand as the dry-sand does to the green-sand as regards the freedom that may be taken with it in putting it together. It is strong and capable of suffering a great deal of rough usage even after it has been finished.

INDUSTRIAL SCIENCE.

Chilling Properties of Cast Iron.

BY A. RUSSELL CALDER, HARRISBURG, PA.

The following data were obtained during a series of experiments conducted at the Harrisburg Car Mfg. Co's works, with various brands and grades of charcoal iron, with a view to determining the laws which govern the chilling properties of the same, and is presented as a contribution to the literature on chilling properties of cast iron. There is probably no other branch of the founder's art about which so little definite information can be obtained, and which is of more importance than the chilling of cast iron. Although this property is often found in anthracite irons, the superior quality of charcoal irons, together with their more excellent chilling characteristics, at once dictate the latter as the proper material for the manufacture of articles requiring chilled surfaces in combination with the requisite strength, it being almost impossible to obtain a heavy chill on an article made of anthracite iron without raising the grade of the mass of the iron to a very high point, and at the same time reducing the strength of the casting to a degree which will render it useless.

The following experiments were conducted in connection with the practical workings of the foundry at a time of great activity, and the conclusions noted are such as were arrived at after numerous observations, covering a period of fifteen months. It was found by repeated trials with various brands, grades and mixtures of iron, that the depth of chill on the casting varied with the temperature of the metal at the time of pouring. Iron which gave ½-inch chill when the metal was poured immediately on leaving the cupola, gave but ¼-inch chill when the metal was allowed to become as cold as possible, without solidifying, before pouring, and the resulting casting had but two-thirds the transverse strength of the one poured with hot iron. The best and strongest casting and the finest chill were always obtained when the iron was poured immediately after ebullition had ceased and the metal had become quiet in the ladle. The falling away in the depth of the chill was not in proportion as the temperature was lowered, but began when the iron became sluggish in the ladle before it was poured, and fell away rapidly until, when the iron was let remain in the ladle as long as possible before solidifying, the chill was reduced one-half. It was found that the chilling property of any iron, or mixture of irons, was greatly influenced by the intensity of the blast, and the proportion of the stock used. By keeping the amount of stock the same and increasing the intensity of the blast, the depth of chill was found to increase in direct proportion; and when the same pressure of blast was obtained, the chill was lowered in proportion as the amount of stock was raised. During this investigation it was satisfactorily shown that the sulphur often found in the stock had a decided tendency to raise the chill and lower the transverse strength of the casting to an undesirable extent, and at times the castings were rendered useless on this account.

ALUMINIUM.—One of the difficulties that would be met with in the use of aluminium is the want of a solder for the metal. At present no easy way of soldering pieces of aluminium to each other or to other metals is known. The solutions usually employed to remove the oxide from the surfaces to be soldered are not applicable to aluminium, and at present no agent is known which will clean the surface of the aluminium without attacking the solder or the other metal. One way of meeting the difficulty is to electroplate the aluminium at the part where the solder is to be applied with a coating of copper, and this is said to be successful. No doubt a more direct method would soon be forthcoming if there were any real demand for it. Aluminium has very few applications at present, It is employed occasionally in chemical laboratories, and it has been used to make light needles and pointers. An alloy of copper and aluminium, containing 10 per cent. of the latter, is used by jewelers, under the name of aluminium gold, for the manufacture of watch cases, chains and similar articles. This alloy resembles gold very closely, and withstands the action of the atmosphere well. Aluminium can be deposited from its solutions by galvanic agency, and a company was once formed to electroplate with aluminium. The battery power required, however, is very great, and nothing practical has come out of this process. Of course the com pounds of aluminium, e. g., alum, acetate of alumina, have extensive applications in the arts, but we have confined our attention in this article to the properties and applications of the element in its metallic condition.

TO REMOVE DRIED OIL FROM IRON OR BRASS.—To effect this without scraping, a number of plans can be suggested. Ammonia (spirits of hartshorn), soda or soda lye, spirits of turpentine, a mixture of alcohol and ether, or benzine (petroleum spirit), may be used, and any one of them may be found to answer the purpose. The use of alkali (ammonia or soda) will probably prove the most effective; but it must be used cautiously, on account of its corrosive action, and afterwards thoroughly removed.

SCIENCE AND INVENTION.

Testing Oils by Electricity.—M. Palmieri has observed that the electric conductivity of oils is notably different. By means of a special bifilar electrometer, which he calls a diagometer, he utilizes this principle for the examination of commercial oils.

Steam Engines.—An English inventor, in order to keep the walls of the cylinder hot, carries live steam in a hollow piston head, or between two piston heads, in contact with the cylinder wall, and provides means for draining off the water of condensation.

Artificial Parchment.—Messrs. Herold & Gawalowski, of Brunn, make as follows a strong artificial parchment, impermeable by water, and capable of serving for the diaphragm in osmotic operations on the solutions of impure sugar, etc. The woolen or cotton tissues are freed, by washing, from the foreign substances, such as gum, starch, etc., that may cover them. They are then placed in a bath slightly charged with paper pulp; and to make this pulp penetrate more deeply they are passed between two rollers, which slightly compress them. The principal operation consists in steeping the product for a few seconds in a bath of concentrated sulphuric acid, after which it undergoes a series of washings in water and ammoniacal liquor until it has lost all trace of acid or base. It is then compressed between two steel rollers, dried between two others covered with felt, and finally calendered, when the sheets are fit for use.

Brennan's Torpedo.—A new torpedo has been invented in Australia, and is thus described: Its motive power is not compressed air, neither is it contained in the body of the torpedo. To propel the weapon through the water at a speed of from fifteen to twenty knots an hour for 1,000 yards, a separate engine, or at least a special connection with an existing one, is necessary. This engine drives two drums, about three feet in diameter, with a velocity at their peripheries of 100 feet per second. Their duty is to wind in two fine steel wires No. 18 gauge, the same as used in the deep sea sounding apparatus of Sir William Thompson. The rapid uncoiling of these wires from two small corresponding reels in the belly of the fish imparts to them, as may readily be conceived, an extremely high velocity. The reels are connected with the shafts of the two propellers which drive the torpedo through the water. The propellers work, as has long been known to be necessary to insure straight running, in opposite directions and both in one line, the shaft of one being hollow and containing the shaft of the other. At first sight it would seem as if hauling a torpedo backward by two wires was a curious way of speeding it "full speed ahead," but it is found in practice that the amount of "drag" is so small, as compared with the power utilized in spinning the reels that give motion to the propellers, that it may be left out of calculation altogether. The steering gear of the Brennan is an ingenious contrivance, whereby the relative velocities of the two driving drums, and consequently of the two propellers, can be varied at any moment. The perpendicular rudder, which is very senistive, is reacted on by the screws, and in this way the torpedo may be made to follow as tortuous a path as a figure-skater. The course the torpedo is taking is indicated to the operator by a slight steel telescopic mast carrying a pennon, which, when not in use, is folded along the back of the torpedo.

A New Gas Burner.—A new burner has been constructed by M. Clamond, and is based on the principle of burning the gas at a temperature of from 800 to 1,000 degrees C. The combustion takes place in the interior of a cone of magnesia of special manufacture, which, under the influence of the heat, becomes incandescent, a light being obtained which is of great fixity and brightness. The magnesia used resists the high temperature for about 52 hours, after which time it must be replaced, the operation of changing being done very quickly.

Improved Varnish Cup.—The unsightly spectacle of a varnish cup with nearly as much varnish on the outside, leaving its circular trade mark wherever it happens to be set, is not one of the least unpleasant things about the paint shop. The first advance from a simple round cup was one with a plane flat side, which made it easier to press out the excess of varnish in the brush after dipping; but this did not prevent the flow of more or less varnish down the outside of the cup. A simple contrivance free from this defect consists of a cup made by simply cutting across the flat side about three quarters of an inch from the top edge and up nearly to the top edge at the ends, and turning the strip inward; but a better way is to use a separate strip for the inclined piece, soldering it to the sides, and folding over the cut edges in order to make a smooth finish. All varnish cups of this kind should be weighted or made heavier at the bottom so that the cup will not tip when using one hand only.

Etching Glass.—A process of etching glass has been invented by Samuel West, Boston, Mass. This process consists in heating the glass to a temperature somewhat below the melting point of wax and spreading molten wax over only those portions of the surface that are not to be ornamented, and subjecting the glass to the action of an etching acid.

Concrete Metallic Fence Post.—Ira S. Kingsbury and George W. Peck, of Monticello, Ind., have patented a combined iron and concrete fence post, consisting of a metallic post with indentations for the reception of wires, inserted into a concrete base made outwardly tapering from the upper end downward, permitting it to be driven into the ground without danger of displacement.

FOREIGN CORRESPONDENCE.

ENGLAND.

Wolverhampton, August 5.

The excitement amongst business men caused by the Egyptian crisis is settled down, but the state of affairs now existing is still affecting business, more particularly in the shipping and coal trades. Private telegrams keep dropping in and are read out on 'Change, announcing that there is no interruption in the Suez Canal passage, but there is a fear that traffic might be stopped at any moment in spite of the precautions which are being taken for its protection. This would, of course, be a serious matter, and shipowners just now are having an anxious time.

In the pig iron trade the advance quoted last week is fully maintained, makers are quoting 44s. 6d. to 45s. for Cleveland No. 3, and are very firm. Merchants are however selling at from 6d. to 9d. per ton under that figure.

The shipments of pig iron have been very good, notwithstanding that they were so heavy in previous months. They amounted, for the four last weeks, to rather over 50,000 tons, and were as nearly as possible the same as those of the corresponding period of 1881. There were shipped to the United States 6,420 tons. Supply and demand seem at the present moment to be very equally balanced. The advance of Scotch pig iron seems to have been chiefly caused by the increased shipments during the last month, and if shipments should continue on the same scale, a still further upward tendency in this article will be seen, but it is too soon to judge whether the extra demand will be permanent or whether it will prove to be only a temporary spurt.

I have already intimated that prices of iron have been hardening, and some substantial rise in values is looked forward to as likely this quarter. Of course this rise in values will depend mainly on the result of the harvest. Much will also depend on the early issue of the Egyptian difficulty. Harvest prospects are not of the brightest at the time of writing, but there is yet ground for hope that, though the hay crop is to some extent spoilt, the wheat crop, which is the principal thing, will be good. The conditions of iron manufacture now are such that even an ordinarily good harvest would cause values to rise considerably. Stocks are low and wages are moderate. The exports of iron are increasing, and larger quantities are being consumed at the local workshops; no surprise is therefore felt that makers themselves will not sell much forward at present rates. It should also be remembered that iron is now, with a few exceptions, at the lowest point it has touched for many years. Even best qualities cannot be made for less without causing actual loss to makers. Such facts seem to give considerable strength to the general feeling in this district that prices must go up soon.

In the finished iron trade there is not much alteration; if anything the market is a shade stiffer. The makers of tee, angle, and girder iron are generally busy, and prices are firm. The galvanized iron trade continues very brisk. The market for wire rods and wire is rather dull just now, but an improvement may set in at any moment.

The steel trade continues very brisk, and prices are strong. The makers of best sheets are doing a steady trade, and the local demand for stamping sheets is good. Best hoops continue to sell but slowly, and most of the hoop mills are only partly on. Prices, however, have reached a point which leaves no profit, and there is therefore no prospect of lower prices. The plate trade, particularly for heavy plates is dull, and there are but few enquiries on the market.

The English are now imitating American patterns of tools for export, hoping to drive the latter out of colonial markets through greater cheapness.

Basket Manufacture.—The manufacture of peach baskets has become an important industry. Years ago the baskets were made by hand, and inasmuch as they cost from 25 to 30 cents, the loss of any considerable number of them was a serious matter. But the establishment of great factories, required by the growth of the peach trade, has reduced the price to a moderate figure, varying from $6 to $8 a hundred. Along the Peninsula railroads there are now eight or nine basket factories, each making from 2,500 to 4,000 baskets a day during the busy season. The bottoms and hoops are made of Maryland pine and the staves from the Delaware gum tree.

English and American Machinery in Russia.—The British Consul at St. Petersburg reports that agricultural steam engines showed a large increase, and trade in these and agricultural implements has never been so brisk as last year. The engines are used solely for thrashing corn, and few villages in the south of Russia are without at least one. There is only one manufactory of these engines in Russia, viz., that of Maltzof. Notwitstanding the great extra cost on English engines, due to freight, insurance, and duty, the Russians are willing to pay this for their greater durability and better working, and large quantities of Ransome's, Proctor's, Marshall's, Clayton's, Robey's, and Burrell's have been sold. The extra cost on an engine sold in England for £240 may be placed at £100. Americans supply at a cheaper rate better horse-rakes, mowers, and reapers with or without self-binders. As these are exempt from duty, Russia does not attempt to enter into competition. The Consul adds: It may seem strange that American makers should so completely drive the English out of the field in this business. An explanation given to me is that they are content with a smaller profit than English makers, and that the iron and woodwork, while sufficiently strong, is lighter and better.

Artificial Ivory.—In making articles of artificial ivory, the greatest difficulty has hitherto been that in order to gain the necessary firmness, a large percentage of the binding substance had to be used, and hence only dark colored articles could be produced. Recently Mr. J. S. Hyatt, the inventor of celluloid, has produced a substance in which only very little gum or other cementing material is used, so that, without detriment to its durability, the finished article may still have a pure white color. This result is arrived at by grinding up any suitable matter with a solution of a proper cement. The cement solution is then expressed, the residue is dried and ground, and the powder thus obtained is heated and pressed into moulds. The most suitable inert matter found is oxide of zinc, and the best cement is shellac or some other similar substance. A solution of ammonia forms the solvent. Hyatt first dissolves 7 parts shellac in 32 parts ammonia, sp. gr. 0.995, by thoroughly mixing the two at a temperature of 37½ C. for five hours in a rotating cylinder. Forty parts of oxide of zinc are now mixed by hand into a thin, syrupy solution, and the mixture is well ground on a color mill. The ammonia, having served its purpose, is now driven off by heat, or by exposing the mixture on glass plates for a long time to the air. The residue, consisting merely of dry shellac and zinc oxide, is again finely powdered, and the powder thus obtained is pressed into the molds with a pressure of about 2,000 pounds per square inch, and at a temperature of 125 degrees to 138½ degrees C. If the article is to be colored, the coloring matter is eitheradded to the solution before the first grinding, or to the dry mass before the second grinding.

RAILROADS.

The Union Pacific Railroad has entered into racing overland freight trains against the southern route. Two trains loaded with tea have made the run from San Francisco to Chicago, via the Union Pacific and the Chicago, Burlington & Quincy roads, in six days and a fraction. This run exceeds that previously made by a train of twenty cars which made the trip from San Francisco to Kansas City only, via the Southern Pacific & Atchison, Topeka & Santa Fe roads, in six days and six hours. It should be borne in mind that the train on the southern route made about the same speed per hour as those on the northern route, but had the disadvantage of nearly 500 miles greater distance, and so fell behind one day en route.

The north-western lines have been specially favored by the rapid development of the regions they traverse. The growth of population and of productive capacity in Manitoba, Dakoto, Minnesota, and adjacent regions has rarely, if ever, been paralleled. It is reflected in the extraordinary increase of the earnings of the St. Paul, Minnespolis & Manitoba, which, on on an increase of mileage from 855 in July 1881, to 1,020 in July, 1882, nearly doubled its earnings during the first seven months of the present year, which shows an increase of $2,148,562, and an increase during the month of July of $465,808. The Northern Pacific also shows an extraordinary gain, its gross earnings being nearly doubled during the first seven months of the present year, the total earnings for this period being $3,265,281, and the increase $1,572,787. The increase reported by the Chicago and North-western and Chicago, Milwaukee and St. Paul are also very noticeable, the gain of the former company during the first seven months of the present year being $1,525,296, and of the latter, $1,917,493.—Phila. R'y. World.

Steady progress continues to be made on the Hudson river tunnel. The total length complete is 1,220 feet in the north excavation and 562 feet in the south, on the New Jersey side, and 50 feet in the north tunnel on the New York side. The heat of the weather, which interferes with outdoor work elsewhere, does not operate as a drawback here.

The track of the Cincinnati & Eastern is now laid and trains are running to Shimar on the eastern line of Adams County, O., which is 12 miles eastward from the late terminus at Newport and 79 miles from Cincinnati. Grading is in progress from Shimar to Otway in Scioto County.

The Pittsburgh, Cleveland & Toledo Co. has bought the franchises and whatever other property the Pittsburgh, Youngs. town & Chicago Co. may own in the projected line from New Castle, Pa., to Akron, O. The company has resolved to issue $2,400;000 in bonds for the purpose of completing and equiping the line.

The stockholders of the Scioto Valley road have decided to extend it from Columbus, O., to Fort Wayne, Ind., and for this purpose they have voted to increase the capital stock from $5,000,000 to $10,-000,000, and to authorize an additional issue of bonds not exceeding $25,000 per mile, or $1,500,000. The stock now issued is $2,100,000, and the increase from this is to be only in proportion to additional construction. The line is extended to give the Chesapeake & Ohio a means of reaching Chicago.

A "Bee Line" is the shortest route between two given points, and this is what the "Bee Line" people claim to have between the great cities of the East, West and South; over the Cleveland, Columbus, Cincinnati & Indianapolis Railway, the Indianapolis & St. Louis Railroad and the Dayton & Union R. R. with lines of through cars without change between Cleveland & Columbus, Cincinnati, Indianapolis & St. Louis. The cars are forty-five feet long, set on standard trucks with the Allen paper wheels, steel tire, (same as used by the Pullman and Wagner Companies under their sleeping cars.) The latest pattern, Westinghouse air and automatic brakes, Miller platform with safety chain and hooks. Inside the finish is all solid mahogany, twenty-six seats with reversible backs, uphosltered in french plain colored cherry plush, with springs in cushions and backs; the windows are large of French plate glass and double blinds. In one end of the coach, in addition to the ladies' and gentlemen's toilet rooms, the Company have placed a wash room with marble basin, and large plate glass mirror free of cost. With the perfect ventilation, and neat and tasty appearance of the whole interior one feels that traveling by rail is no longer a burden but a pleasant recreation. That the people along the line will appreciate the new departure of this enterprising Company, we have no doubt.

ELECTRICAL RESISTANCE.

By electrical resistance is meant the opposition offered by every constituent part of the circuit to the passage of a current. There is first the resistance of the generating battery itself; in a chemical battery the acidulated water, or electrolyte, offers a very high resistance, then comes the resistance of the leading wires, and in addition the resistance of every constituent portion of the circuit, be it electric machine, resistance coil, electro-magnet, telegraph machine, or the carbons of a series of electric lights; in fact, any retardation of the current, caused by material impediment or by work to be performed, is known by the name of resistance, which can be tested and measured; but whatever obstacles a current may have to encounter, its way must be continuous and unbroken by the smallest interval. It will be seen from this that resistance is merely a relative term. Every substance can be electrified, some with greater and some with less difficulty. The metals, for instance, such as german silver and copper, can be electrified almost instantaneously. Other substances—glass, carbon, shellac and gutta percha—take a very long time, and require persistent electric excitation to become so.

Generally speaking, substances which can be very easily electrified are known as conductors, and those which are slowly electrified are called insulators. Neither term is strictly accurate. It is only a question of degree. Even the best conductor offers a certain amount of retardation, and the worst conductor known is permeable in time, and does not afford insulation. To be sure the limits of variation in this respect are wide enough. An uncovered wire of copper will allow a current to move along it at the rate of 288,000 miles a second, and it would take minutes and perhaps hours to creep over an inch or two of gutta-percha. Still, as a mathematical fact, neither insulators nor conductors are perfect. The two properties are reciprocals. If we take 100 as the standard of conductivity or absolute non-resistance, pure copper wire would show, perhaps, ninety-six or ninety-eight of conductivity and four or two of resistance. Gutta-percha, at the other end of the scale, might show less than one of conductivity and more than ninety-nine of resistance. I have not at hand the exact figures, but these will serve as an illustration of the meaning.

The mathematical formula known as Ohm's fundamental law states electrical resistance to be inversely proportional to the strength of the current. An illustration of this is seen in the case of a lightning conductor. A small copper wire will carry away a moderate current without disturbance, because the current and resistance of the wire have some manageable relation to each other. But if a flash of lightning were to pass along the same wire, it would fuse the wire; because, although the resistance would be the same, the proportion borne by the electro-motive force of the lightning to the conductivity of the wire would have no manageable relation to the current. On the same principle a piece of carbon introduced into a circuit stops the passage of a feeble current, being a bad conductor. It, however, allows a strong current to pass; but, before doing so, it offers such vigorous resistance that the energy necessary to overcome the resistance is sufficient to heat the carbon white hot; or, if there be a break in the carbon, to cause an electric arc at the point of fracture. This is the principle of the electric light.

Mechanical Ingenuity.—The following is a description of the talking machine as improved by Joseph Faber, son of the inventor: The principal features of the machine are, to begin with, the bellows, from which the air is driven with considerable but varying force, by means of a pedal lever. The air passes in a horizontal stream in a small chamber, which represents the human larynx, and in the same right line out through the mouth. The lips and tongue are India-rubber, and the lower jaw is movable. Below the laryngeal apparatus, and opening from the chamber in which it is contained, is another smaller chamber, about the size and shape of a lemon, from which a pipe curved upward allows the air when driven through to escape. This supplies the place of the nose instrument, and when a valve is opened, enables the sound of the letters 'm' and 'n' to be produced by the striking of the same keys with which the sound of 'b' or 'p' are obtained. The larynx is, of course, the most complex part of the machine, and to Herr Faber is due the elaboration of this portion of the mechanism. Within a small oblong box a narrow and exceedingly thin strip of hippopotamus bone, strengthened by India-rubber on one side, produces, by its vibrations, the speaking tone, which may be called the fundamental sound to be subsequently modified. At the will of the operator the pitch can be raised or lowered, but not during the utterance of a word or sentence, so that in saying "Mariana," or "Comment vous portez vous!" (the machine talks French, German, Italian and English) the key note remains unaltered to the end. In front of the vocal chord and within the laryngeal chamber are stops or diaphragms, placed vertically, and rising and falling like the wards of a Chubb's lock, but different in that each stop is a complex machine in itself, having within, moved by a spring, another stop, by means of which an orifice at the base is enlarged or diminished. Herr Faber has taken another liberty with nature, for, besides placing the nose below the mouth, for the sake of convenience, he has placed the teeth in the larynx, or more properly speaking, with one of these stops he gets a somewhat lisping 's' or the sound 'sh' from the machine. A small wind-mill like arrangement gives the rattle of the letter 'r,' and a thin iron band, notched in the lower rim in front, fitting outside the upper lip, descends to give the 'f' or 'v' sound. There are fourteen keys by which sounds are controlled. Striking the first the sound of 'a' in 'father' is produced, the mouth remaining wide open; another key being struck, the lower jaw rises and the sound of 'o' in 'bowl' is given; a third key moves a lever; which nearly closes the mouth, and the sound of 'o' in 'movement' is emitted. The other vowel sounds and the consonants are produced by the use of diaphragms in the larynx with the mouth in the second or third position.

MINES AND MINING.

The mines of Great Britain have 58,644 miles of underground tunnelling, and 378,151 persons work in them.

The second mining expedition of the season has just started for Alaska, where it is expected to open a very rich silver mine, exceeding in value anything known in this generation. The company prospected the grounds last season, and is said to be sure of great success.

A new mining district of unprecedented richness has been discovered in northern Montana. It comprises both placer and quartz diggings. The placer diggings produce about $40 a day to the man, and the quartz assay in high-grade silver from $3,000 to $12,000 per ton, and is free milling.

The Commissioner of Mining Statistics places the total production of refined copper from the mines of Lake Superior, ending with the year 1881, at 328,138 tons 1,370 pounds, representing a value of $151,571,458.

Mr. P. W. Sheafer of Pottsville, writes as follows respectiug the supply of coal of the United States, and the methods of mining it. The coal resources are all developed now, and in process of depletion; while in this country, when our 470 square miles of anthracite are exhausted, we have more than 400 times that area, or 20,000 square miles of bituminous, from which to supply ourselves and the rest of mankind with fuel. The coal product of the world is about 300,000,000 tons annually. The North American continent could supply it all for 200 years. With an annual production 50,000,000, it would require twelve centuries to exhaust the supply. But with a uniform product of 100,000,000 tons per annum, the end of the bituminous supply would be reached in 800 years. What the annual consumption will be when this continent supports a teeming population of 400,000,000 souls, as will be the case some day, must be left to conjecture. But with half that population as energetic, restless and inventive as our people in this stimulating climate have always been, under the hopes of success such a country as this constantly holds out to tempt ambition and reward enterprise, it is a very moderate estimate, guided by the actual output already reached in great Britain, to suppose that there will be ample use for 100,000,000 tons a year of bituminous coal for home consumption alone. We have about 340 collieries, and produce 20,000,000 tons of anthracite per annum, or abont 60,000 tons each. Great Britain has nearly 4,000 collieries, and mines 132,000,000 tons, or 33,000 tons per colliery. The greater the yield per colliery the less the expense in mining. If we decrease the number of mines and increase their capacity not only to raise the coal, but to exhaust a constant current of foul air and dangerous gasses, clouds of powder, smoke and millions of gallons of water, we will reduce the cost of mining. Most of the anthracite mining in the United States is now done at a less depth than 500 feet vertical; but as the coal nearer the surface becomes exhausted the mines must go deeper and become more expensive.

Mr. Masey, the representative of the English Corporation Copper Mines, South Australia is about exploring for

alleged rich deposits of mercurial ore, which it is asserted the blacks have been working to a large extent for many years, using the material for painting their bodies. The supposed locality is somewhere in the Harachilwa Ranges, and another deposit is believed to exist in the Aroona Ranges.

The Mining Gazette remarks that the gradual increase in the production of copper on Lake Superior is due, in a measure, to the more intelligent system in working the older or standard mines. As a result the region is attracting the attention of capitalists, who are undertaking the development of old and new mineral tracts. More is being done at the present time to test the capabilities of the country as a copper producer than ever before in its history.

The Globe copper mine, Arizona, has commenced operations, turning out at the rate of 9½ tons of copper every twenty-four hours, or a total of 570,000 pounds per month. The Buffalo follows next, the furnaces are in full blast, and the copper bullion runs out at satisfactory rate. The Hoosier smelter has been ordered, the site of which is being graded and reduction work on the 80 feet of good grade copper ore will become a fact within the next seventy days. The ore in sight in the Globe, that by actual measurement in the Buffalo, and the eighty feet of Hoosier ore, will not be less than 100,000 tons giving a net product of 15 per cent assay value of a total of 15,000 tons of ingot copper, the value of which at 20 cents, the eastern contract price, would be $6,000,000.

N. R. Grant, the well known prospector and miner of the Jordan District, Union county, California, who has been encamped on the mountain side near the Mona Lake toll house for several weeks past, spent five days of last week in prospecting the Major Island of Mona Lake. He says that along near the eastern selvage of the island are some coal croppings from which issue thermal water and a dense black smoke having the odor of burning stone coal. The springs are confined to the eastern base of the mountainous island, while the smoke issues from the croppings above. In a cove formed by an arm of the island putting out eastward into the lake is a fine fresh water spring, in the center of which is a large wooden post marked "M. P." which looks as though it had been exposed to the elements for many years. In a large cove on the western side of the island is a great field of tules in which rises warm water that is quite palatable when cooled.

In the way of mining safety appliances for the prevention of explosions in mines, the system adopted in mines by Mr. Morgan, of Ponty Pridd, Wales, deserves special attention, inasmuch as he adopts a system of withdrawing the gas and burning it at the pit's mouth, but the consumption of gas ensures a down current of fresh air to the workings, sufficent to render all accumulation of carbonic acid gas innocuous. Mr. Morgan's system is a full developement of plans suggested by the late Professor Farraday and Sir Charles Lyell. Roughly speaking the plan consists in a series of tubes at the lowest level of the mine, and where the firedamp falls this gas necessarily rises through the tubes to the surface where it is consumed. By applying extra power there is practically no limit to the amount of foul gas which these tubes will withdraw and consume. The amount of gas which twenty blowers will withdraw being equal to 500 cubic feet per minute, per blower. Of course the more gas that is withdrawn, the greater amount of pure air will find its way into goafs and cavities, to replace the foul air. The cost of ventilating and withdrawing by this system amounts to a normal sum royalty per ton. But whether the cost be big or little, the cost of an explosion is irreparable to a colliery owner, to say nothing of the loss of valuable lives. Mr. Morgan is also the inventor of an improved mining safety lamp.

Mr. D. P. Kayner, writing to the Chicago Mining Review from Hancock, Mich., observes: I have visited several of the copper mines in this vicinity, including the Quincy, Pewabic, Franklin and Hancock on the North shore of Portage lake, and the Atlantic, Huron, and the Grand Portage on the south side. While the copper belt may be said to extend through the same Trapean range, yet the associations of vein matter differ somewhat in different mines. The conglomerate veins in some being rich in copper, while in others the metal is only found in the Amygdaloid. A conglomerate vein found in the Atlantic mines carries no copper, while its amygdaloidal deposits yield an average of ¾ of one per cent. In the Huron and Grand Portage mines, and in specimens I have seen from the Osceola, copper is found in the green epidote. The yield of copper from the different mines here varies from ¾ of one per cent. to three and a half per-cent. of the rock crushed. The pockets in some of the levels of the Quincy, afford large masses which will run from 60 to 70 per cent., and weigh several hundred pounds. I have closely studied the processes of working and smelting the products of the mines here and am more than ever satisfied that, with my improved smelter, the copper mines of Colorado and New Mexico can be made as valuable sources of revenue in smelting this 30 to 40 per cent. ores, as are the native copper mines of the upper peninsula of Michigan; and it can be done at much less expense in the "plant" for raising, concentrating and refining the metal. This is especially true in the expense of mining. The lower levels of the Quincy are down 2400 feet from which pumping has to be done and rock raised. The copper veins of New Mexico do not extend over 300 feet in depth, and the kidney ore is more of a blanket formation, requiring but little machinery in mining, and $10,000 can be saved on the stamp mill alone--a crusher only being required. With my compound hot air and gas, ore and metal furnace, working with wood which is abundant on the claims, making its own gas and charcoal smelting and refining in the same furnace economy is secured.

The Anglo-Saxon race appears to be emphatically the coal race. The Germans and the English come from the same stock, and both of them have helped very materially to people the United States. Taking the coal production of Great Britain at 135,000,000 tons per annum, while Germany and the United States raise about 100,000,000 tons of coal annually between them, we arrive at the remarkable fact that three countries which may be said to have sprung from the Anglo-Saxon stock produce annually at least 235,000,000 tons of coal. In British dependencies, such as British India, Nova Scotia and New South Wales, a small further contingent of coal is also made available for combustion. Belgium and France raise between them 30,000,000 tons of coal annually. Austria, Russia, Spain, and a few other countries also produce small further quantities of coal; but while Great Britain, Germany and the United States raise annually 235,000,000 between them, we should not imagine that the corresponding production effected by all other nations attains a collective aggregate of 75,000,000 tons annually. Are we not, then, fully justified in asserting that the Anglo-Saxon race is emphatically the coal race? We will go a step further, and will venture to affirm that it is just because it is the coal race, that the Anglo-Saxon race has achieved the greatest advance in material civilization. We are not quite sure that this material civilization is an unmixed boon; unless it is softened by such influences as religion, art and education, material civilization degenerates into materialism and nothing more; and materialism is the parent of selfishness, which brings enormous evils in its train. Again, it must in fairness be admitted that even material civilization is many sided, and does not present only one aspect to the impartial observer. Although France may not produce so much coal as Great Britain or Germany, she is none the less a great, a powerful and a rich nation. If she has less machinery and less steam power she has a prosperous and varied agriculture; and the ease with which she raised and paid a huge war indemnity in 1872 and 1873 proved that her people have contrived to amass a great amount of wealth.—*Fred. E. Saward in The Coal Trade.*

The importations of iron ore into the United States during the fiscal year 1881 was in gross tons 621,073. Of this Spain sent us 263,575 tons; from the French possessions in Africa came 111,345 tons; from Italy we received 65,229 tons; from England we got 64,228 tons; from France 23,289 tons; and from Portugal and Ireland 10,000 tons each.

Photographers' sensitive plates, exposed at a depth of 300 feet, show that light penetrates clear water to that depth.

MARKETS.

Office of TRADE REVIEW AND WESTERN MACHINIST.
FRIDAY EVENING, August 18.

FINANCIAL.

Considerable sums of currency have been called to the country to remove wheat. The quotable discount rates in bank are 7@8 per cent. Desirable commercial paper is placed at the former rate. Collateral loans have been made at 5 per cent. on call, and 6 per cent. on time, the demand being fairly brisk. Eastern Exchange has ruled heavy at 1-20 dis. buying and 1 20 @ par selling. There has been a moderate movement in Government bonds, prices varying with those in New York. In local securities there have been fairly active transactions at comparatively firm prices.

IRON.

There have been large deliveries of pig iron on old contracts with current sales of small lots. Prices are firm, this firmness being aided by the high price of foreign brands. There is an uncertainty as to the future caused by the Western strike. Although transactions are unimportant, the demand promises to be fully equal to the supply. Desirable brands are scarce. We quote Foundry No. 1 X $26@$26.50; Foundry No. 2 X, $24@$24.50; Gray Forge, $22. For Scotch pig the demand is moderate. We quote Coltness $26.50 to $27, Glengarnock $24.50 to $25. Gartsherrie $26 to $26.50, Summerlee $26 to $26.50, Carnbroe $24, Eglinton $23 from dock, and $23.50 from yard, Langloan $26.50 to arrive. The demand for scrap iron has improved and we quote $29@$30 from yard. For iron rails quotations are still $45@$48 per ton at mill, according to section. Very little new business is reported, and sales have been chiefly of small lots of light sales. For old rails in which little business has been done, quotations are $26@$27 per ton and $28@$28.50 for double heads. For steel rails the market is quiet, with a number of sales of small lots, chiefly for early delivery. Quotations continue $49 to $50 per ton at mill for immediate delivery, and about $47 for winter orders. A large demand continues for tank iron.

CINCINNATI.—(Reported by Messrs. Rogers, Brown & Co.)—The pig iron market is marked by the same characteristics as a week ago—a steady demand, firm prices and a good feeling. While there is nothing to impart special buoyancy, there are yet strong supports to the market that can be relied upon for some time to come. Scotch and Cleveland stocks abroad have decreased 108,000 tons in six months and are still falling. In the East consumption is again keeping pace with production. In the Pittsburgh district prices continue weak and depressed and will until the mills resume; but the product of the furnaces there seeks no outlet, and cannot well influence surrounding markets. In the several Ohio districts, stocks are slowly increasing. In the South sales ahead of production amount to 65,000 tons by coke furnaces alone. With a large and uniform demand assured, producers of iron feel confidence in the future. We make a few alterations in prices required by the changed condition of the market. Our quotations are for cash: Hot blast foundry—Hanging Rock CC. No 1; $26.50@$27.50; No. 2, $25@$26.50; Southern, No. 1, $24.50@$26.50; Strong Coke, No. 1, $23.50@$24 50; No. 2, $22.50@$23.50; No. 3, $21.50@$22.50; Soft Stone coal, No. 1, $22.50@$23.50; No. 2, $21.50@$22.50. Forge—Strong, Neutral No.1, Mill, $21.50@$22.25; Cold Short, No. 1 Mill, $21.50@$21.25. Car Wheel and Malleable—Hanging Rock Cold Blast, $32@$34; Hanging Rock Warm Blast, $26@$29; Southern Car Wheel Iron, $32@$36; Lake Superior do. $30@$33; Lake Superiar Malleable, $30@$33.

CINCINNATI.—(Reported by Messrs E. L. Harper & Co.)—The market continues very firm. The question of supply and demand is awakening interest and receiving consideration by many. The supply is very little in advance of demand and it is problematical as to how long "supply" will occupy this position in the race. The continuance of a healthy general business and the revival of railroad traffic will bring fresh vitality to the already invigorated market which must result in the increase of demand. The prospects are not favorable for the rolling mills resuming at an early date, but should the anticipated condition of things exist when the mills reopen a decided and sharp advance in mill iron will be looked for. There is no speculative feeling apparent anywhere, but should it be awakened, the present aspect of the iron market would be materially changed, the actual supply of Pig Iron being but little more than required for current consumption.

COPPER.

The fact that a large proportion of consumers are well supplied, and will be for some time to come, naturally keeps the market quiet. Dealers and consumers are receiving supplies almost wholly from the mining companies direct. We quote Lake Superior at 18¼c@18½c; Anchor brand and Baltimore are worth 17¾c. London has advanced to £68 10s. and £73 for best selected. Inquiries have again come from Europe, but as producers are not prepared to part with copper below the current local ruling, nothing can be done for export. Manufactures are unchanged. We quote: Bottoms, 31c@32c; Braziers, 30c@36c; Circles, 33c@36c; Sheathing, 28c, and Bolt Copper, 30c; Segment Sheets, 33c; Fire-box ditto, 30c.

LEAD.

The demand for common Pig has been wholly of a jobbing character with moderate sales at 5¼c to 5.15c, while Refined is quoted 5.15 to 5.20. The tone of the market has been quiet and steady. Foreign brands can be laid down here for about 5.20 to 5.25 cents.

TIN AND TIN PLATES.

The market for Pig has ruled quiet and about steady at 25 to 25½ cents in a jobbing way and 24½ to 24¾ for round lots. Sales mostly future have aggregated about 150 tons. London has advanced to 103.15. We quote for round lots Banca 28 cents, Straits and Malacca, 25 to 25½; Billiton, 25 to 25¼; Australian, 25¼ to 25½; English L. & F. 24½ to 24¾; and English Refined, 24½ to 24¾. For tin plates the market rules quiet with unchanged quotations.

SPELTER AND ZINC.

Little is doing in spelter, and the general outlook of the metal remaining the same, prices are still nominally 5.35@5.40c. for Domestic and ordinary foreign. Sheet-zinc quoted 7@7½c.

ANTIMONY.

This metal remains quiet and steady at 11@11¼c. for Hallett's, and 13@13¼c. for Cookson's.

HARDWARE.

The demand for general hardware is steadily increasing. No changes in values have been announced during the week and the tone of the market is strong. A satisfactory trade is looked for in the Fall. The inquiry for nails is very active, and the ruling price for large or small is beyond the card rate. Whilst the card remains unchanged, nails, owing to scarcity of stock and increased demand, have advanced to $3.75. Large purchases of barb wire continue, and there is a strong demand for the best description of mechanics' tools.

LUMBER.

There is a fair demand at the lumber yards. No changes in values have been announced during the week and the tone of the market is decidedly strong. A good many buyers from the country have come into the city the past week, and purchases have been made on a liberal scale. When farmers are less busy their requirements will be considerable. Stocks are plentiful. No idea is longer entertained of a break in the market. The condition of affairs at the lumber supplying points is unchanged.

The prices obtained for shingles have somewhat improved. The movement all along the line at present is steady for actual consumption but no speculative tendency is manifest; in fact the present high value of lumber in first hands precludes that possibility. This phase of the lumber business, also, will tend to prevent a speculative tendency during the current season.

WOOL.

There has been an active and somewhat firmer tone in the market, and a comparatively large business has been done. In the Eastern market sales of Ohio fine delaine have taken place at 44c@46c.

Cleveland Wholesale Prices.

HARDWARE.

Adzes.

Carpenter's.....per doz $18 40
Ship..... " " 18 75
Heavy railroad.... " " 19 50

Axes.

Hunt's.....₱ doz $ 9 50
Lippincott's Crown ₱ doz 9 00
Cut More ₱ doz 9 00
Peck's Double Bit. ₱ doz 22 00
" Champion Blade ₱ doz 11 00

Anvils.

Eagle, Amer... per lb. 10c dis 20
Wright's..... 10¾c@11c
Armitage's Mouse Hole 9¾@9¾c
Trenton..... 10¾c
Wilkinson's..... 10¾c

Anvil Vise and Drill.

Millers Falls Co. $28.....dis 20
Cheney Anvil and Vise..dis 25&2

Vises.

Solid Box, list of July 1, '79, dis 35
Solid "Crown" (A. H. Hildick).....40 to 100 lb, 15c net
Solid, Peter Wright's.....15¾
Solid, Wilkinson's.....13¾
Parallel, Parker's.....dis 40
Saw Filers, Hopkins' ₱ doz $17.50, dis 10
Reading.....dis 45&10
Cowell Hand Vises.....dis 20
Richardson's Vise and Anvil.....dis 25

Augurs and Bits.

C S cut augers.....dis 40&10
do do do bits.....40&10
D C gimlet do Ives....dis 50
Snells bits.....dis 40
Russell Jennings' augers dis 16⅔ & 10&10
Cook's pat augur.....40&10

Animal Pokers.

Berea, per doz..... 4 00
Eagle, per doz..... 5 00

Apple Parers.

Domestic & Reading ₱ doz..$7 50
Turn Table..... 9 00

Bolts.

Machine.....dis 60
Bolt ends.....dis 60
Plow.....dis 50
Plow, R. B. & W.....dis 40
Cast Iron Barrel Shutter, etc.....dis 50&10
Cast Iron Chain (Sargent' list).....dis 60&10
Ives' Pat. Door Bolts..dis 50
Wrought Barrel.....dis 55&10
Wrought Square.....dis 55&10
Wr'g't Shut'r, all iron, Stanley's list.....dis 50&10
Tire, R. B. & W., new list.....dis 70&10
Stove, American Screw Co.'s.....dis 40
Bolt Ends.....dis 60

Bellows.

Dis

Blacksmith's com new list, 45 ₱ct
Moulder's new list, dis 25 ₱ cent
Hand, new list, 25 per cent

Butts.

Dis

Wrought brass.....65&10
Cast, loose joint.....10&10
Pin, japanned and silver tipped.....45&10
Wrought, fast joint narrow.....40&10
Wrought fast joint broad.....40&10
Wrought loose joint broad.....45&10
Wrought table and back flaps.....40&10
Loose joint, reversible.....45&10

Cleveland Stamped Elbows

Genuine Russia Iron

4 inch per doz..... 4 50
4½ do do..... 5 50
5 do do..... 7 50
5½ do do..... 8 50
do do..... 9 50
do do.....11 00

Planished American Russia Iron

inch, per doz..... 4 00
4½ do do..... 5 00
5 do do..... 6 50
5½ do do..... 7 50
6 do do..... 8 50
do do..... 9 50

Charcoal Iron

4 inch, per doz..... 2 00
4½ do do..... 2 50
5 do do..... 3 50
5½ do do..... 4 00
6 do do..... 4 50
7 do do..... 5 50

25 per cent

Chisels.

Hot and cold cutting.....₱ lb 30
Railroad track..... 30
Machinists..... 30
Mallet head..... 50
Tape..... 50
Packing..... 50
Stone cutters..... 50

Crowbars.

Cast steel.....₱ lb 8¼
Iron, steel points..... 6¼c

Cutlery, Pocket and Table.

Meriden Cutlery Co., table..net
Am. Miller Bros.' Cutlery Co.....dis 25
Humason & Beckley, pocket 33⅓
Naugatuck Cutlery Co...list net
Aaron Berkenshaw's pocket dis 25

Coopers' Tools.

Bradley's..... dis 14@20
Barton's..... dis 20

Chains.

Coil by cask.....

3-16	¼	5-16	⅜	7-16	½
10½	9	8	7	6½	6¼

Drills and Drill Stocks.

Blacksmiths', each...$2.50 dis 10
Blacksmiths', self-feeding, each 7.50 dis 20
Breast, P. S. & W.....dis 20&10

Drawing Knives.

Witherby's.....dis 65@10
Nobles Mfgr. Co.....15
Adjustable handle.....20

Emery and Emery Paper.

Regular Numbers.....₱ lb 6c
Flour and F. F.....₱ lb 4c
B. & A. Emery Paper..dis 30&5

Enameled and Tinned Ware.

Kettles.....dis 50
Sauce Pans.....dis 25
Tinned Sauce Pans.....dis 50

Files.

Auburn...35 to £. dis 35 pr cent
E. M. Boynton's, new list..dis 25
J. & Riley Carr.....4.50 to £.
Johnson & Bro.....dis 20
Butcher's.....4.50 to £.
Walter Spencer & Co.'s "Diamond".....4.50 to £.
Fisher's.....4.75 to £.
Moss & Gamble.....4.50 to £.
H. Disston & Sons (new list).....dis 40 per cent
Heller Bros.' Horse Rasps dis 25
Nicholson.....dis 40
New American.....dis 40
Union File Co.....dis 40

Grindstones.

Ohio.....1¼@1¾ ₱lb
Nova Scotia.....1¼@1¾ ₱lb

Hammers.

Maydole's.....dis 15
Cheney's.....dis 25
Hartford Hammer Co.....dis 20
Humason & Beckley.....dis 50
Verree.....dis 5
Magnetic Tack, Nos. 1, 2, 3, $1.25, $1.50 and $1.75, dis 25&10
Nelson Tool Works....dis 40&10
Warner & Noble's.....dis 5
Kip's.....dis 15
Yerkes & Plumb.....dis 15
Wilkinson's Smiths' 11¼c ₱ lb net

Hatchets.

Yerkes & Plumb:--Shingling, Nos....1, 2, 3, ₱ doz $7 50, $8 00, $8 50, dis 25
Claw, Nos....1, 2, 3, ₱ doz $8 25, $8 75, $9 25, dis 25
Lathing, Nos....1, 2, 3, ₱ doz $7 50, $8 00, $8 50, dis 25

Nails.

10 to 60d..... 3 40
8 and 9d..... 25
6 and 7d..... 50
4 and 5d..... 75
3d..... 1 50
2d..... 2 75
3d fine..... 3 00
2d fine..... 3 75
⅞ inch..... 3 00
4d barrel..... 1 00
1¼ inch barrel nails..... 1 50
1¼ do do do..... 1 75
1 do do do..... 2 50
⅞ do do do..... 3 00
Cut spikes, all sizes..... 25
Clinch nails, all sizes..... 1 75
Casing and box nails 75 cts advance
Finishing nails, $1 25 do
Tobacco nails, 50 cts do

Nuts and Washers

Nuts, square.....7c off list.
Nuts, hexagon.....6c. off list.
Washers.....6c off list.

Picks.

Railroad, 4 to 5 lbs...doz $7 75
5 to 6 lbs... " 7 75
to 7 lbs... " 8 50
7 to 8 lbs... " 9 50
Railroad Tamping Pick 7 to 8 lbs...doz 13 50
Mill Picks per lb..... 75c

Rivets.

Iron.....dis 40
Tinned.....dis 40
Copper.....dis 33⅓

Squares.

Dis

Steel or iron, case lots.....50
Try squares and T bevels.....40

Spikes—WROUGHT

All lengths by ¼ inch.....4¼c
do do do 5-16.....3½
do do do ⅜, 7-16 & ½ in 3¼

Shovels and Spades.

Ames' new list, July 1, 1881,..... dis 15
Old Colony.....dis 15
Remington's (Lowman's Patent).....dis 30
Rowland's.....dis 40 and 10
Griffiths.....dis 40&10

Saw Sets.

Boynton s patent X Cut, per doz $12; Hand Saw, per doz $10.....dis 20
Stillman's Genuine, per doz $3 50 and $5 50.....dis 20
Stillman's Imitation, per doz $3 25.....dis 20&10
Common Lever, per doz $2 dis 30&10
Leach's No. 0 $8; No. 1 $15; dis 15
Hammer, Hotchkiss $5 50, dis 10
" Bemis & Call Co.'s new patent.....dis 40&5
Bemis & Call Co.'s Lever and Spring Hammer..dis 30&5
Bemis & Call Co.'s Plate..dis 10
" " Cross-cut dis 12½
Aiken's Genuine...$13, dis 50&10
" Imitation.....$7, dis 50
Hart's Patent Lever.....dis 20
Disston's Circular.....dis 40

Sad Irons.

From 4 to 10 lbs....per lb 3¼ net
Self-Heating.....₱ doz $9 net
" Tailors. ₱ doz $18 net
Gleason's Shield and Toilet.....dis 25
Mrs. Pott's Irons, double pointed.....dis 35
Mrs. Pott's Irons, square back.....dis 35
Enterprise Star Irons.....dis 40
Combined Fluter and Sad Iron.....₱ doz $15, dis 15

Scales.

Hatch, Counter, No. 171.... ₱ doz. $42, dis 37½ & 10
Union Platform.....$6, dis 45
Fairbanks'.....dis 20
Buffalo Scale Co.....dis 20&5
Forsyth Scale Co.....dis 25
Howe's.....dis 20&10
Chatillon's Eureka.....dis 25
Family Universal.....dis 50
Scale Beams.....dis 33⅓ & 10

Bag Holders.

Sprengle's Pat, $18.00 per doz 40 per cent. dis.

Planes.

Ohio Tool Co.....dis 25
Sciota.....dis 30
Bailey's Pat. Adjstble..dis 20@25

Rules.

Stanley.....dis 66⅔ and 10

Sash Locks. Discount.

Payson Mnfg. Co. "Perfect"..42
Simmons' Sash Supporters....20

Hinges.

Champion double acting spring hinges.....dis. 30
Screw & Strap 8@12 in.....$6. net
Gravity Locking Blind Hinges, Sargeant & Co. 70&10

Screws. Dis

Flat head iron or steel per cent dis..... 30
Flat head brass..... 30
Round head iron or steel.. 25
Round head brass..... 20
Brass and Silver capped.. 40
Japanned, list of Plain Screws..... 20
Coach, patent Gimlet point, list per 100..... 60
Lag, taper points..... 60
Bed..... 10
Machine, flat head, iron.. 55
round head, iron 50
Bench, iron.....55&10
wood, beech, per doz $3..... 10
wood, hickory.....20&10

Valves. Dis.

Jenkins' Patent Gate Valves..35
" " Globe " ..40
" Standard Packing " ..20

Wrenches.

Coe's genuine.....40 & 10
Coe's imitation wrought bar..60
Mechanics' 60 and 10

Wire.

Brass and Copper.....dis 20
Bright & annealed, Nos. 0 @ 18 dis 50@52½
" " Nos. 19 @ 26 dis 60
" " Nos. 27 @ 36 dis 65
Coppered.....Nos. 0 @ 18, dis 45
Galvanized, Nos. 0 @ 18, market list,.....dis 40@42½
Tinned, Nos. 0 @ 18,....dis 40@45
Cast steel.....dis 40
Tinned Broom Wire, Nos. 18 @ 25.....dis 55
Annealed Fence, Nos. 8 and 9.....dis 55@52½
Annealed Grape, Nos. 10 to 14.....dis 52½
Galvanized Telegraph, Nos. 7 to 9.....₱ lb 7¼c
Galvanized Telegraph, Nos. 10 to 11.....₱ lb 8¼c
Galvanized Telegraph, No. 12.....₱ lb 10¼c
Fence staples.....₱ lb 5½@5¾c
Fence Staples, galvanized, ₱ lb 7@7½c
Stubs Steel Wire....$7 00 to £
Barb Wire, painted.....8¼c
Barb Wire, galvanized.....9¼c
Crucible Steel Ropes from ⅜ in. at 9c to 1¼ in. at.....52c
Best Selected Iron Ropes from 3-16 in. at 3c. to 1¼ in. at.....33c

Boiler Plates.

("Gaylord"--Standard Quality.)
C. No. 1..... 4 50
C. H. No. 1 Shell..... 4 75
C. H. No. 1, 50,000..... 5 25
C. H. No. 1, 55,000..... 5 75
C. H. No. 1 Flange..... 6 50
Firebox.....
T. S., 60,000.....(as per)..6 50
T. S., 65,000.....(act of)..
Homo. Steel, 70,000 (of Cong).7 50
Heads, ¼c ₱ lb. extra.
N.B.—Eastern brands of boiler plate at from 2-10 to 3-10c ₱ lb less than above prices.

Sheet and Tank Rivets. "Norway."

All sizes.....dis. 15

Boiler Rivets—" Albany."

⅛, ¾, 11-16, and ¼ in. diam. 5 50

Boiler Makers' Tools.

Doty's Power Shears....net list
" Hand Lever Shears.net list
" Power Punch.....net list
" Hand Punch.....net list
Steel Screw Punch.....net list
Iron Screw Punch.....net list
Boiler Plate Rolls.....net list
Buffalo Forges & Blowers dis 20
Watson's " " net list
Spring Tube Expander....dis 15
Roller Tube Expander..net list
National Tube Cleaner...dis 20
Wire Flue Brushes.....net list
Anvils—"Peter Wright" 12¼ ₱ lb
Solid Box Vises.....net list

Nuts, Bolts, etc.

Square & Hex. Nuts....7 off list
Washers..... list
Machine Bolts.....dis 60
Bolt Ends.....dis 60
Boiler Patch Bolts.....net list

Boiler Tubes.

"National" Standard Gauge 1 inch to 10 inch.....dis 37½
"National" Standard Gauge 11 inch to 15 inch.....dis 25
"National" Special Locomotive Tubes.....net list

IRON AND STEEL.

Flat Bar.

1¼ to 4 by ¼ to 1 inch..... 2 60
4¼ to 6 by ¼ to 1 inch..... 2 70
1¼ to 6 by 1¼ to 1¼ inch.... 3 00
1¼ & 1¾ by ¾ to ¼..... 2 70
1 & 1¼ by ¼ to ¼..... 2 80
⅝ ¼ and ¾ by ¾ to ½..... 3 00

Round.

1 to 1¼ inch..... 2 60
2 to 2¾..... 2 80
2¾ to 3¼..... 3 10
3¾ to 4..... 3 60
4¼ to 4½..... 4 10
4¾ to 5..... 4 30

Square.

1 to 1¼ inch..... 2 60
2 to 2¾..... 2 80
2¾ to 3¼..... 3 10
3¾ to 4..... 3 60
¾ to ¼..... 2 70

Heavy Band.

1¼ to 6 by ¼ and 5-16 inch. 2 80
1 to 1¾ by ¼ and 5-16 do 2 90
¾ to ⅞ by ¼ and 5-16 do 3 10
⅝ to ¼ by ¼ and 5-16 do 3 60

Half Oval and Half Round.

Wagon box iron ¼ and ⅜.. 4 10
1-10c per lb extra will be charged for cutting to specified lengths

Light Band.

1¼ to 6 by ¼ to 3-16..... 3 10

Hoops.

1¼ to 2, Nos 16 to 18..... 3 50
1¼ to 4 do 13 to 15..... 3 40
1-10 extra for each gauge lighter

Sheet Iron.

No 22 to 24..... 4 50
No 25 to 26..... 4 70
No 27..... 4 90
No 28..... 5 30

English Steel.

Best cast.....₱ lb 15¼c
Extra cast..... 16¾c
Round machinery, cast 10c
Swaged, cast..... 18c
Best double shear..... 15¼c
Blister, 1st quality.... 13c
Refined tool steel..... 16¼c
Spring calking..... 7¼@7¾c
German steel, best.... 11c
2d quality..... 10c
3d quality..... 9c
Sheet cast steel, 1st quality..... 15¼c
2d quality..... 14¼c
3d quality..... 12¾c

American Steel.

Best brands of refined cast steel, ¾ to 2 inches....12c
Crucible cast.....7c
Open-hearth ditto..... 4¼c
Hammer cast steel..... 9c
Spring cast steel..... 7½c
Bessemer and open-hearth spring..... 5c
Ditto plow..... 4¼c
Steel boiler plate..... 6¼@7c
Bessemer machinery..5 @6c
Spring and calking....7¼@7½c
Tire..... 5
Sleigh shoe..... 5

Bessemer Steel Tire.

¾ to 1 by 3-32..... 4½ ₱ lb
¾ to 1 by ⅛ to 5-32..... 4½ ₱ lb
¾ to 1 by 3-16 to ¼..... 4½ ₱ lb

Miscellaneous Cast Steel.

Auger and auger bit..... 1
Axle steel for wagons..... 7
Frog points and plates..... 8
Frog size bars..... 8½
Pick, hammered..... 10
Mattock, beveled..... 9
Table cutlery..... 7½
Trap spring steel..... 10
Pike and cant hook..... 9
Coal and granite..... 8½

TINNER'S STOCK.

Tin.

Banca, ...per lb. 28@29c
Straits..... " 24@25c
English..... " 24@25c
Bar..... " 27c

Tin Plate,

IC 12x12 charcoal.....$ 6 50
IC 14x20 do.....6 25@6 50
IX 14x20 do..... 8 25
DC 12½x17 do..... 6 00
DX 12½x17 do..... 8 00
DXX, 12½x17 do..... 10 00
DXXX, 12½x17 do..... 12 00
IC, 20x28 do..... 14 50
IX, 20x28 do..... 15 50
IC, 14x20, Best Roof..... 6 00
IX, 14x20, do..... 8 00
IC, 20x28 do..... 13 00
IX, 20x28 do..... 14 50
IC, 10x14 Best Coke..... 5 75

Solder.

Half and Half, in bars.....15½
No. 1 do.....14½
Spelter Solder.....25

Pat Planished Sheet Iron.

[A].....per lb 10½c
[B]..... 9½c

Nos	10	15	21	25
	to 14	20	24 & 26	
Com	3-60	3-80	4-00	4-20
Char	5-60	5-60	6-00	6-20

Sheets over 28 in. wide ¼c extra

Zinc.

Sheet, cask..... 7½@ 7¾
Sheet, open..... 8@ 8¼

Tinners' Tools & Machines

Machines (P. S. & W.) list add 20
Tools (P. S. & W.).....add 6

Plumbers', Steam and Gas Fitters' Supplies.

Wrought Iron Pipe.....dis 60.
Steam Brass Goods.....dis 45
Water " " .....dis 40
Enameled Pipe.....dis 65
Artesian Well Casing....net list
Hydraulic Tubes.....net list
Malleable Iron Fittings..net list
Cast Iron Fittings.....dis. 45
Globe Valves.....dis. 35
Angle Valves.....dis. 35
Check Valves.....dis. 45
Safety Valves.....dis. 35
Ludlow Gate Valves.....dis. 20
Ball Gauge Cocks (net per dozen).....$15
Compression Gauge Cocks dis. 35
Montg'ry Gauge Cocks...dis. 35
Register Gauge Cocks (net per piece).....$1 00
Cylinder Cocks.....dis. 30
Air Cocks (net per dozen)...$2 75
Oil Cups.....dis. 30
Steam Gauges.....dis. 40
Water Gauges.....dis. 40
Scotch Glass Tubes.....dis. 50
Steam Whistles.....dis. 45
Pipe Tools.....special
Globe, Angle and Check Valves (Star's regrinding).....dis. 25
Duplex Injectors.....net. 20
Soil Pipe & Fittings.....dis. 20
Sinks.....dis. 25
Bath tubs &c.....dis. 20

Babbitt Metal.

No. 1.....₱ lb 16
" 2..... " 14
" 3..... " 10
" 4..... " 8

LEAD.

American, ₱ lb..... 5¾c
Bar, ₱ lb 5¾c dis 10 per ct
Pipe, ₱ lb 5¾c dis 10 per ct
Sheet, ₱ lb..8c dis 10 per ct
Tin-lined pipe ₱ lb 15c dis 10 pr ct
Shot Drop 7c; Buck.... 7c
Chilled Shot..... 8c

COPPER.

Lake Ingot.....18¼@18¾c
Baltimore..... 17¾c
Arizona..... 17¾c
Sheathing Braziers Copper, Bolts, &c.
Brazier's Copper, ordinary sizes, 16 oz. per sq. foot, and over per lb.....30c
Brazier's Copper, ordinary sizes, under 16 oz. and over 12 oz. per sq. foot, per lb. 32c
Brazier's Copper, 10 oz. and 12 oz. per sq. ft...per lb. 34c
Brazier's Copper lighter than 10 oz. per sq. ft...per lb. 36c
Circles less than 84 inches in diameter.... per lb. 33c
Circles 84 inches in diameter and over.....per lb. 30c
Segment and Pattern sheets per lb. 33c
Locomotive Fire Box sheets per lb. 30c
Sheathing Copper, over 12 oz per sq. ft.....per lb. 28c
Bolt Copper.....per lb. 30c
Copper Bottoms..per lb. 31@32c
No copper is Sheathing except 14x10 inches, and not to exceed 34 oz. to the sq. ft.

Tinning.

14x18.....per sheet 6c
All other size sheets, 2½c per square foot For tinning both sides, double the above amount.

SCRAP IRON AND OLD METAL

DEALER'S SELLING PRICES.

	Net Tons.
No. 1 wrought scrap.....	$24
Sheet and hoop "	10@11
Cast scrap, (No. 1 heavy).	19
Cast Scrap (Stove Plate).	12

OLD METALS.

Old copper per lb.....	15c
No. 1 H. Brass per lb.....	14
Heavy yellow Brass do.....	12
Light Brass per lb.....	12
Scrap Zinc per lb.....	6
Tea Lead per lb.....	4
Heavy Lead per lb.....	3

PIPE, WROUGHT.

Standard Wrought Iron Lap Welded Steam and Gas

Inside Diameter. Inches.	Plain, Price Per Foot.	Galvan or Enameled Per Foot.	Outside Diameter Inches.	Weight Per Foot.
⅛..	08		.40	.24
¼..	08	$0 11	.54	.42
⅜..	09	12	.67	.56
½..	11	15	.84	.85
¾..	13½	19	1.05	1.13
1..	19	28	1.31	1.67
1¼..	27	40	1.66	2.26
1½..	33	47	1.90	2.69
2..	46	64	2.37	3.66
2½..	75	1 00	2.87	5.77
3..	95	1 30	3.50	7.55
3½..	1 25	1 70	4 00	9.05
4..	1 50	2 05	4.50	10.73
4½..	1 75	2 40	5.00	12.49
5..	2 25	3 00	5.56	14.56
6..	2 75	4 00	6.62	18.76
7..	3 75	..	7.62	23.00
8..	4 75	....	8.62	28.00
9..	6 50	....	9.68	34.40
10..	8 00	....	10.75	40.64
12..	12 00	....		54.65

Discount, 62½ per cent; galvanized, 62½ per cent.

BRASS.

Cash prices for Roll and Sheet Brass. For less quantity than 100 lbs. add 3c per lb.

High Brass.

All Nos not thinner than to No. 28, wider than 2 in. not wider than 14 inch.....30c
All Nos. to No. 28, inclusive, and widths over 14 to 20 in. inclusive..... 35c
All Nos. to No. 28, inclusive, and widths over 20 to 30 in. inclusive..... 38c
½c per lb. advance on each No. above Nos. 28 to 38, inclusive.
All Brass thinner than No. 8 is Platers' Brass at.....33c
Sheets 24x48, and all sheets cut to particular sizes and lengths under 30 inches, in width wider than 2 inches.37c

Low Brass.

4c per lb. more than High Brass.
Gilding metal 8c per lb. more than High Brass.
Platers' or Gold Metal
In Bars.....48c
Sawed.....51c
Planed or Polished...54c

For Slitting.

Metal in width in. to ½ in. to No. 28, inclusive, 1c per lb advance.
Metal, in width 2 in. to 1 in., thinner than No. 28, 2c per lb. advance.
Metal, in width ½ in. to ¼ in. thinner than No. 28, 5c per lb. advance.
Metal ¼ in. in width and less, 10c per lb. advance.
Any of the above widths cut to particular lengths, add 7c per pound.

COAL,

WHOLESALE.

Wholesale f.o.b. vessel at Cleveland:

Carbon Hill and Monday Creek.....$2 65
Massillon..... 2 75@ 2 85
Brier Hill..... 3 25@3 75
Pittsburgh..... 3 00
Salineville..... 2 25
Tuscarawas..... 2 25

RETAIL.—Delivered.

Massillon Lump.....$4 00
" Nut..... 3 75
Carbon Hill and Monday Creek, lump..... 3 75
Carbon Hill and Monday Creek, nut..... 3 50
75c less on cars by car load.
Anthracite Stove and Chestnut..... 7 15
Egg and grate..... 6 00

GLASS.

(Per box of 50 feet)

SINGLE THICKNESS

6x8 to 10x15.....	
11x14 to 15x24.....	8 50
16x24 to 20x28.....	9 75
15x34 to 24x30.....	10 75
26x28 to 24x36.....	11 50
26x36 to 26x44.....	13
26x46 to 30x50.....	14 00

DOUBLE THICKNESS

6x8 to 10x15.....	11 7
11x14 to 15x24.....	13 25
16x24 to 20x28.....	15 75
15x34 to 24x30.....	17 25
26x28 to 24x36.....	18 50
26x36 to 26x44.....	21 25
30x50.....	22 50
30x52 to 30x54.....	23 25
30x56 to 34x56.....	25 00
34x58 to 34x60.....	27 75
36x60 to 40x60.....	30 00

Dis 60 & 15 single, 60 & 20 double

OILS.

Pure Oils. packages included

Sperm, winter bleached per gal.....	1 25
Whale, winter bleached per gal.....	63
Straits.....	50@53
"A" oil for tanner's use	35 @40
Lard oil extra W S....1	05@1 10
do No 1 do.....	82@87
do No 2 do.....	72@77
Tallow oil.....	75
Neatsfoot oil pure....	90@95
do No 1.....	80@85
Linseed oil, raw.....	55
do do boiled.....	58
Cotton seed oil white..	64 @ 66
do do yellow	60 @ 63
West Virginia lubricating 28 deg.....	12c@15c
Pure Mecca.....	55@ 50
Paraffine oil winter pressed.....	25@ 30
Machinery.....	40
Engine.....	50
Miners' oil.....	40@45
Drilling oil.....	40

Hides and Leather.

Prime cured hides,	7½
Green hides.....	6@6½
Bull, scrubby, badly scored or damaged, cured, two-thirds price.	
Prime dry hides.....	13@14
Horse hides, green....	$1 75@2 00
Horse hides, dry.....	$2 00@2 24
Prime cured veal calf,	12½
Prime Deacon S, salted.	65@70
Pelts, wool on.....	32@34
Fresh slaughter sheep	30@$1 50
Fresh slaughter lambs	50@60
Green calf skins.....	13
Hemlock rough.....	23@24
Oak harness.....	34@38
Oak sole.....	37@40
Union harness.....	31@34

Cleveland Business Directory.

Assayers and Analytical Chemists.

JUDSON, W, E, Ana ytical Chemist, 8 Cushing Block.

Bolt and Nut Works.

HOTCHKISS & GAYLORD, manuf'rs. Machine, Plow & Elevator Bolts, Coach Screws.

Boiler Makers.

SMITH & TEACHOUT — (Established 1857.) Boiler, Tanks, Stills etc. 439 Broadway.

Bridge Builders.

BUCKEYE BRIDGE AND BOILER WORKS mfrs of Arch & Truss Bridges, Boiler Tanks and Oil Stills. Bet. Wasson St. and Case Ave.

Coal and Iron Exchange.

JACKSON IRON CO. Iron Ore and Pig Iron. Rooms 8 and 9. Fayette Brown, Gen. Agent.

RHODES & CO. Coal, Iron Ore an Pig Iron. Rooms 1 and 2.

Carriage Blacksmith.

STRIEBEL, CHAS. manfac'r. of Carriages and Wagons and platform trucks. Horse shoeing and general blacksmithing .93 Woodland ave.

Carriage Bolts.

THE COLWELL & COLLINS NORWAY BOLT CO., manufacturers of Philadelphia Carriage and Tire Bolts.

Church and School Furnture.

FAULHABER, GEO. manufacturer of School and Church Furniture. Fine Hard Wood work a specialty. 203 Ontario Street.

Custom Boots and Shoes.

ROONEY, JOHN manufacturer of hand-made Boots & Shoes, custom made and warranted 177 Ontario Street.

Carriage Repository.

GREENE'S, J. O., Carriage Repository, 408 Superior street and 52, 54 & 56 Rockwell street, dealer in Fine Carriages. Repair shop in connection.

SLATER, G. A., Carriage dealer, sells the best work for the lowest price. A fine assortment always on hand. Repository 365 Euclid Avenue.

Coal and Pig Iron.

ANDREWS, HITCHCOCK & CO., Briar Hill Coal and Pig Iron. 122 Water Street.

Electrical,

ELECTRIC SUPPLY CO. manfrs and dealers in Electric Burglar Alarms, Annunciators, Cell Bells and Batteries. Telephone lines built and repaired. 145 Seneca Street.

Fresco Artists.

KEMMER & KUSHMAN DECORATIVE CO., Fresco Artists, Fine Modern Wall Papers. 238 Euclid ave.

Foundries.

BOWLER & CO., Car Wheels, Patent Chilled Frogs, and all kinds of castings. 9 Winter.

CLEVELAND MALLEABLE IRON CO., manufacturers Malleable Iron Castins.

LAKE SHORE FOUNDRY, Water and Gas Pipe, Light and Heavy Castings. Alabama st.

TAYLOR & BOGGIS, successors to H. & H. F. Taylor, Iron Founders, 65 to 73 Central Way.

VIADUCT FOUNDRY COM'Y, Aenis, Carlin & Strangward manfrs of Machinery Castings Fine Light Castings a Specialty. Office & Works 11 13 15 and 17 Detroit Strert, near Center.

FITZSIMONS WM, & SON, Rolling Mill and Machinery castings. Rolls a Specialty. No. 435 Broadway.

File and Saw Works.

PARKIN, W. H. & CO., Hand-cut Files and Rasps, dealers in Disston's saws, 11 So. Water

Flue Cleaner.

CLEVELAND FLUE CLEANER M'F'G. CO. manufacturer of Aitchison & Doolittle's Patent Steam Flue Cleaner, 22 & 24 Power Block.

Hotels.

FOREST CITY HOUSE, cor. Public Square and Superior st., Terrill & Ingersoll, Props.

KENNARD HOUSE, D. McClasky, Prop.

NEW ENGLAND HOTEL. Water st., W. W. Wolcott, Prop. Refitted and refurnished.

STRIEBINGER HOUSE, between Ontario and Seneca sts. $2.00 per day. Hawley & Langton

CITY HOTEL, Seneca street. H. B. West, proprietor. $1.50 per day.

Hides, Pelts and Leather.

DENNISON BROS., dealers in Hides, Pelts, Furs and Tallow, 48 and 50 River street.

Hardwood Lumber.

MARTIN, J. T. dealer in Hardwood Lumber, Stone's Levee, near Central Way.

Lumber.

WOODS, PERRY & CO., manufacturers and dealers in Lumber, Lath, etc., 5 Carter st.

FISHER, WILSON & CO., wholesale lumber dealers (pine & hard wood), rough and dressed umber, timber, lath, shingles, etc. 47 Central Way

KRAUSE, C. A., & SON, wholesale and retail dealers in lumber. Yards cor. Superior and Wason and 281 Merwin streets.

Cleveland Business Directory.

Hardware and Iron.

BINGHAM, WM. & CO., Hardware, Iron, Nails and Metals, 148 and 150 Water street.

CLEVELAND ROLLING MILL CO., manuf'rs. of Steel and Iron Wire and Steel Tire.

WORTHINGTON, GEO. & CO., Hardware and Dealers in Metals. Water street.

Lime Manufacturers.

RUSSELL LIME CO., manufacturers of White Lime; also dealers in Plaster, Cement, etc. 85 Elm street.

Machinery and Boilers.

CLEVELAND STEAM FURNACE CO., Engines and Boilers, cor. Detroit and Center sts.

KRITCH, K. E. Metal Pattern Maker. Small machinery repaired. Lawn Mower sharpening a specialty. 42 South Water Street.

Machinery Depot.

CLEVELAND MACHINERY DEPOT, (now National Machinery Depot.) The largest stock of New and Second-hand Engines, Boilers and Machinists' Tools. Shop and Warehouse corner Bond and Superior streets.

Mercantile Agency.

THE MERCANTILE AGENCY. R. G. Dun & Co. proprietors. 121 Superior street.

Oil Manufacturers.

AMERICAN LUBRICATING OIL CO., manufacturers of lubricating oils, 23 Euclid ave.

Paints and Oils.

MASTERS, J. N. jobber in Paints, Oils, Varnishes. Brushes, 34 Prospect st.

Pattern and Model Makers.

WHITTINGHAM, J. & C., Metal Pattern and Model makers. 52 Canal Street.

REID, J. C., Pattern and Model Maker. 52 Canal Street., (Up Stairs.)

COTTRELL & CO., W. L., Pattern Makers, 53 Center street.

STAIR BUILDER.

PFEIL, CHAS, Stair Builder; Hard Wood Mantles and Office Railing. Works, 49 & 51 Canal street, Cleveland, Ohio.

JOHNSON & PURSER, Stair Builders, and manuf'rs of Mantels, Odd Pieces of Furniture, &c. 30 West street, up stairs.

Steel Stamps and Stencils.

FLEHARTY, J. H. & CO., Rubber Stamps, Seals, Stencils. 197 Superior street.

Tanners.

GAENSSLEN BROS., Tanners, and dealers in leather, oil and shoe findings. 80 Water-st.

Trunks and Valices.

FABER, J. manuf. Trunk, Traveling Bags and Ladies' Fine Satchels. Sample Trunks and Cases a Specialty. 56 Public Square.

Vessel Agents.

WEBB, H. J. & CO., Ship Brokers and Vessel agents. 17 & 18 Board of Trade Building. 122 Water Street.

Wood Carving.

HERKOMMER, J., Carver and Ornamenter in Composition. 225 Erie street.

Business Directory.

Akron, O.

AKRON IRON CO., manufacture best Common, Refined and Charcoal Iron.

CASCADE HOUSE, cor. Mill and Summit sts., near Depot. J. Downie, Prop.

MCNEIL, J. C., Steam Boilers, Heavy Sheet Iron Work. Repairing promptly executed.

PERKINS, C. E., dealer in Agricultural Implements, machinery, and Manufacturers' Ag'nt

TAPLIN, RICE & CO., manuf'rs. of Stoves and Hollow Ware, dealers in Tinners' Stock, etc.

WEBSTER, CAMP & LANE MACHINE CO., Founders and Machinists, 12 Main street.

AKRON POLISHING & PLATING WORKS.

Alliance, O.

ARLINGTON HOUSE, cor. Main and Liberty Streets. Centrally located. Sample Room for Commercial Travellers. H. S. Adams, proprietor

MCFARLAND, J. W. Engine and Machine Builder, and General Machine Jobbing.

Cuyahoga Falls, O.

THOMAS BROTHERS, manfrs of Ohio Stone Ware. Cuyahoga Falls Stone Ware Factory, cor. Main and Broad streets,

TURNER, VAUGHN & TAYLOR, manufacture engines, presses and grinding machinery for clay; also paper, chain, wire and flour mill machinery. Send for Circulars and price list.

SNYDER, H. wholesale manu acturer of Sash, Doors, Blinds, &c. Send for Price Lists.

THE CUYAHOGA FORGE AND IRON CO., manfrs. of every description Car, Truck and Driving Axles, Forging, Shafting. &c.

Canal Dover, O.

HECKMAN, E., manufr. and dealer in harness leather, upper, kipp and calf. Also, manufacturer & dealer in prime English Dairy cheese. Highest market cash price paid for hides.

Business Directory.

Columbus, O.

PAT. ADJUSTABLE WINDOW CURTAIN Cornice, manufactured by Strader's Curtain Cornice Works.

ROYCE & PULLING manufrs of Patent Steam Pumps for all purposes. Store room 30 High street. Works Nos. 5 and 7 Scioto street.

U. S. CARRIAGE CO. builders of fine Carriages, Buggies and Phætons. Salesrooms and Office 257, 259 and 261 Fourth street.

REYNOLDS BROS., manufacturers of hand-cut Files and Rasps. Old files re-cut. Send for Price List.

CITY BOILER WORKS, manfrs of Stationary, Portable and Locomotive Steam Boilers. All work warranted. Borger Bros. & Co.

MURRAY, HAYDEN & CO., manfrs of Malleable Iron. Cor. Randolph & West streets.

Canton, O.

DIEBOLD SAFE & LOCK CO., manuf'rs. Safes, Locks, Bank and Safe Deposit Works.

NOVELTY IRON WORKS, Mill work, Shafting, engines, Imperial job printing press, etc

NEW AMERICAN HOUSE, Canton. Fred. Hipp, Prop.

EBERSOLE & KAILEY, Machine and Jobbing Shops. Gearing for Patterns or Machinery a specialty. Models of all kinds made & repaired.

Geneva, O.

THE ENTERPRISE MACHINE CO., L. L. Crane, Pres't, manfrs of Machinists' Tools and Machinery. Gear Cutting a specialty.

Lima, O.

LIMA HOUSE, centrally located; telegraph office in the house. J. Goldsmith, Prop.

Massillon, O.

CITY CARRIAGE WORKS, P. H. Young, prop. manfact'r of Carriages, Phætons and Spring Wagons. Work warranted. Cor. Tremont & Erie.

Painesville, O.

NORTH AMERICAN CUTLERY CO., m'fr's of Steel Shears and Scissors—best quality.

Ravenna, O.

THOMPSON, T. F., dealer in Agricultural Implements, farm machinery, hardware, seeds, fertilizers, &c. Cor. Main and Prospect sts.

BALDWIN, D. L. & SON, Contractors & Builders and manfrs of all kinds of Moulding, flooring, siding, &c. Rip, Band and Scroll Sawing.

Steubenville, O.

DORRANCE, D.W., Tool Works, manufacturer of hand-made miners' and stone-cutters' Tools. Promp attention given to mail orders.

Sandusky, O.

SANDUSKY WHEEL CO. manfrs. of Sarven Patent Wheels, Carriage Bodies and Seats, Plain Wood Hub Wheels, Banded Hub Wheels, Jacobs' Patent Neck Yokes.

Toledo, O.

BAKER, HERBERT, Machine Shop and Iron Foundry. 98 and 100 Erie street.

TOLEDO FOUNDRY AND MACHINE CO. builders of Steam Engines, Circular Saw Mills and all kinds machinery. Water St., cor. Cherry

RUSSELL IRON WORKS, mnfrs. of Architectural Iron Work, castings, pulleys, shafting and steam bending machinery. Cor. Water and Lagrange streets.

STANDARD SAW WORKS, H. Bartley, manufacturer and dealer in Saws of every description. All kinds of Springs made from Sheet Steel. Reaper, Hay Knives Truss Springs, &c. made to order. 92 St. Clair Street.

UNION Wooden Ware Manufacturing Co. manufacture Sewing machines, washboards, children's wagons, carts, wheelbarrows, sleds, kitchen wooden ware, &c.

HEPBURN BROTHERS, proprie. Union Boat Works. Boats of all kinds made to order. For sale or rent. Water Street foot of Cherry.

Youngstown, O.

BELL, EDWIN & SON, manuf. of Nail Kegs, Pat. coiled hoops, slack barrel and keg heading and oil barrel stock.

DINGLEDY, G. H. dealer in rough and dressed Lumber, Shingles and Lath.

MORTON HOUSE, formerly Maitland House, James Morton, Prop.

TOD HOUSE, cor. Diamond and Market streets. Henkel & Bowman, Props.

Zanesville, O.

KIRK HOUSE, William Kirk, proprietor. $1.50 per day.

Rochester, Pa,

OLIVE STOVE WORKS, (limited) manufacturers of Stoves and Hollow Ware.

Erie, Pa.

ERIE STEAM BENDING WORKS. H. G. Fink, prop'r, manufacturer of Bent Felloes, poles, shafts, bob runners, etc. Cor. 12th & Cherry.

GUNNISON, A. B., wholesale manufacturer of Wood Pumps. 233 East Twenty-Second St.

BALL ENGINE CO., limited, manufacturers of Automatic Engines of 15 to 80 horse power

NOBLE SEWING MACHINE CO. manfrs of the New Noble Sewing Machine. Send for circulars and prices.

A. B. FELGEMAKER & CO. Church Organ builders. Descriptive catalogue furnished on application.

Business Directory.

Titusville, Pa.

FOSTER & McKAY, dealers in boilers and engines, tubing, casing, old iron, rope, and all kinds of metals. Washington street, nr. Railroad.

Meadville, Pa.

CURRY & CO. general jobbers in Castings of al kinds.

Oil City, Pa.

REID, JOS. Machinist, steam engine and pump repairing. Brass and sron castings, light and heavy, made on short notice.

Sandy Lake, Pa.

EBERMANN, W. S. & SONS, manfrs. of the celebrated Ebermann Boiler Feeder. Send for Circulars and Price List.

Pittsburgh, Pa.

PRINTING PRESSES. W. A. Bunting, manufacturers' agent. Printers supplies, type, cards. 42½ Sixth Street. [Up stairs.]

BAIR & GAZZAM, practical machinists; gear cutting a specialty. Rice's Feed Water and Heater. 17 Wood street, corner First Avenue.

Wheeling, W. Va.

EXCELSIOR MACHINE WORKS, Redman & Co., general machinists and manufacturers of Marine and Stationary Engines, Hangers, Pulties, Shafting, &c. Cor. 18th & Chapline streets.

Louisville, Ky,

HAIGHT, ROBERT, Gold, Silver and Nickel Plating and Brass Finishing Shop. Car Trimmings and Steamboat work a specialty. 1 West Market street

Union City, Ind.

LAMBERT, J. W. & CO., mfrs of fork, rake, hoe and broom handles; spokes, hubs, whiffletrees, yokes, plow-rounds, &c. Correspondence solicited.

Olean, N. Y.

MYRICK BROS. & CO., manufact'rs Engines and Boilers, oil drilling tools, rig irons, etc.

Rochester, N. Y.

GOWE, JNO. N., mfrs. of Specialties, such as Machine forging, bridge bolts and trusses, railroad switches, spike, mall, chisels, &c.

ELEVATORS for Hotels, Factories and Private Houses. J. S. GRAHAM & CO.

WOOD-WORKING MACHINERY. Send for Catalogue. J. S. GRAHAM & CO.

RAZOR STROPS. Sole mfrs. of all kinds of Razor Strops. Ulscht, Linn & Co. 131 N. Water

Buffalo, N. Y.

SANDS, PAUL, Marine and Stationary Steam Engine Works mfr. of drilling mach ines, foot and power lathes. 70 Columbia street.

EMPIRE STATE MF'G CO., O. F. Swift, prop'r, manfr of Fluters, Sad Irons, Spun Copper & Half Copper Tea Kettles. Washington, cor. Ohio

WHITE, L. & I, J. manfrs of Coopers' Tools, Carpenters Tools, Draw Shaves, Cleavers Choppers, Ship Tools, &c. 312 Exchange street.

THE BUFFALO NUT AND BOLT CO. [Limited.] Manufrs. of Hot Pressed Nuts, Bolts, Washers, Rivets, &c. No. 226 Ohio Street.

Rheims, N. Y.

GREAT WESTERN CHAMPAGNE. Finest made in America. Equal to best imported. Has taken highest awards everywhere, and is used all over the Continent. Try a case, and you will have no other. Pleasant Valley Wine Co., Rheims, N. Y.

Brattleboro', Vt,

A JOY FOREVER!

ESTEY ORGANS

Manufactured by

J. ESTEY & CO.,

Brattleboro', Vt.

(Catalogue free on application.)

COATES'

"Independent Lock Lever"

HAY AND GRAIN RAKE.

Patented August, 1867, January, 1875, June, 1875, and November, 1876. 60,000 now in use. Light touch of lever and driver's weight dumps it. Best self-dump in market. Twenty steel teeth. No complicated ratchet wheels, friction bands or other horse machinery needed to operate it. A small boy rakes easily twenty acres per day with the Coates' Lock Lever. Send for circulars.

A. W. COATES & CO.
Alliance, Ohio.

LUMBER.

PLANK, MIXED WIDTHS.
2 inch, 12, 14 and 16 feet, together.

A 1 and 2 uppers	$50
A 3	40
B	32
C	20
D	14
E	12

1¼ and 1½ inch.

A 1 and 2 uppers	$48
A 3	40
B select	32
C	20
D	14
E	12

BOARDS.
One Inch, mixed widths.

A 1 and 2 uppers	$44
A 3	36
B select	30
C	19
D	15
E	13

STOCK BOARDS.
12 Inches wide.

A 1 and 2 uppers	$45
A 3	34
B	32
C	21
D	16
E	13

STRIPS.
6 Inches wide.

A 1, 2, and 3	$42
B	33
C	22
D	17
E	13
Norway Fencing Strips	17
Norway Flooring Strips	25

WORKED LUMBER
FLOORING.

Flooring—A 3	$42
B	38
C	24
D	18
Norway Flooring—A 3	28
C	22
D	18
Matched Drop Siding, 6 inches—A 3	42
B	35
C	24
D	18
Beaded Ceiling $2 higher than Flooring.	
One half inch Bevel Siding—A 1 and 2	24
A 3	20
B	18
Ash Flooring—A 1 and 2	40

BILL STUFF.

Small, joists, 12, 14 and 16 feet	$14
Timber, larger than 8x8 special.	
Timber, longer than 18 feet, adds about $1 per foot per M. extra.	
Cedar Posts, large	30 00
" " medium	25 00
" " small	$15 to 20 00

SHINGLES, LATH AND MILL WORK

Shingles XXX	$4 50
Clear Butts	3 25
Lath	3 00
Surfacing, one side, adds $1.25; two sides $1.50	
Matching, flooring and drop sidings, $2.50.	

LAKE FREIGHTS.

COAL.

Buffalo to Chicago	$.62½@.65
Toledo to Chicago	1.00
Cleveland to Chicago	70@75
Erie to Chicago	70@75
Oswego to Chicago	1.50
Fairhaven to Chicago	1.30
Buffalo to Millwaukee	70@75
Cleveland to "	70@75
Erie to Milwaukee	75
Buffalo to Racine	80
Buffalo to Kenosha	85

IRON ORE.

Marquette to Lake Erie ports	1.25
Escanaba to Lake Erie ports	90@95
Escanaba to Chicago	90@95
Marquette to Chicago	1.15@1.20

Crowl's Patent Iron

Roofing,

For Steep or Flat Roofs.
NO MORE NOISE OR LEAKING.
TIN AND SLATE ALSO FURNISHED.
Agents wanted in every County.
Cambridge Roofing Co.
Cambridge, Ohio. J. E. ANNIS, Sec'

JUDSON'S PATENTED
SECTIONAL
Assay Furnaces
AND APPLIANCES.
Model Furnace for 1881,
All steel, light and durable, with Revolving Grate, etc. Also
Judson's Practical Stoking Attachment
Guaranteed to feed coal, coke or charcoal without choking the draft.
Manufactured only by the patentee,
W. E. JUDSON,
Cleveland, O

Cleveland to New York
In Pullman Cars, via
Cleveland & Pittsburgh and Pennsylvania
RAILROAD.

ON and after Sunday, June 4, 1882, trains leave Cleveland and arrive at the points named below as follows: (Night Express runs daily, all other trains daily except Sundays.)

Blue Grass Route of Ohio

TIME TABLE.

The Cleveland, Mt. Vernon and Delaware RAILROAD.

GEO. D. WALKER, RECEIVER.

Schedule No. 5--Dating from Sunday, June 4.

SOUTH-BOUND TRAINS.

STATIONS.	Accom	Accom	Expr	Mail	Sundays only
Leave.	P. M.	P. M.	P. M	A. M.	P. M.
Cleveland	5.30	3.45	2.30	8.50	....
Hudson	6.53	5.02	3.35	10.10	4 20
Cuyahoga Falls	7.11	5.30	3.58	10.29	4 40
Akron	7.23	5.46	4.10	10.42	5 00
*North Portage	P. M.	6.00	4 24	10.54*	6 14
Clinton	....	6 19	4.44	11.09	5 31
Warwick	....	6.29	4.49	11.14	5 37
*Marshallville	....	6.43	5.02	11.27*	5 50
Orrville	....	6 58	5.14	11.42	6 02
*Apple Creek	....	7.17	5.32	11.58*	6 22
Fredricksburg	....	7.32	5.45	12.11	6 37
*Holmesville	....	7.43	5.55	12.21*	6 48
Millersburg	Accom	7.55	6.08	12.34	7 00
	A. M.	P.M.			A.M.
Millersburg	5.50	....	6.08	12.34	7 00
*Killbuck	6.02	....	6.20	12.47*	7 12
*Black Creek	6.13	....	6.31	12.59*	7 25
Gann	6.33 b 6.53 b	....	6.51 7.11 s	1.19	7 47
Danville	7.04	....	7.20	1.29	7 59
Howard	7.13	....	7.29	1.38	8 10
Gambier	7.22	....	7.38	1.47	8 20
Mt. Vernon	7.35	....	7.51	2.00	8 33
*Bangs	7.45	....	8.01	2.11*	8 45
*Mt. Liberty	7.53	....	8.09	2.20*	8 54
Centerburg	8.05	....	8.18	2.30	9 05
*Condit	8.19	....	8.32	2.44*	9 19
*Sunbury	8.27	....	8.40	2.53*	9 28
*Galena	8.32	....	8.45	2.58*	9 34
Westerville	8.48	....	9.00	3.15	9 50
Arrive at Columbus	9.15	.....	9.25	3.40	10 20
	A.M.		P M.	P.M.	A.M.

NORTH-BOUND TRAINS.

STATIONS.	Expr	Mail	Accom	Accom	Sundays only
Arrive at	P. M	P. M.	A. M.	A. M.	A.M.
Cleveland	1.45	6.55	10.15	8.30	....
Hudson	12.35	5.48	8.53	7.15	10.30
Cuyahoga Falls	12.16	5.30	8.33	6.58	10.11
Akron	12.03	5.17	8.20	6.45	9.50
*North Portage	11.46	5.00*	8.03	A. M.	9.34
Clinton	11.30	4.44	7.46	.....	9.18
Warwick	11.25	4.37	7.37	.....	9.12
*Marshallville	11.10	4.27*	7.23	.....	9.00
Orrville	10.57	4.14	7.10 b 6.40 b	.....	8.47
*Apple Creek	10.40	3.56*	6.22	.....	8.27
Fredricksburg	10.26	3.43	6.08	.....	8.13
*Holmesville	10.16	3.33*	5.58	Accom	8.02
Millersburg	10.05	3.22	5.45	7.50	
			A. M.	P. M.	P.M.
Millersburg	10 05	3.22	.....	8.35	7.25
*Killbuck	9 51	3.08*	.....	8.23	7.13
*Black Creek	9.39	2.57*	.....	8.11	7.00
Gann	9.17	2.36	.....	7.49	6 38
Danville	9.07	2.27	.....	7.39	6.25
Howard	8.58	2.18	.....	7.29	6.14
Gambier	8.49	2.09	.....	7.14	6 03
Mt. Vernon	8.37	1.57	.....	7.02	5.51
*Bangs	8.22	1.40*	.....	6.46*	5.37
*Mt. Liberty	8.14	1.31*	.....	6.37	5.28
Centerburg	8.05	1.22	.....	6.28	5.17
*Condit	7.51	1.09*	.....	6.14	5.03
*Sunbury	7.42	1.01*	.....	6.06	4.53
*Galena	7.37	12 56*	.....	6.00	4 47
Westerville	7.20	12.40	.....	5.43	4 30
Leave Columbus	6.55	12.15	.....	5.15	4.00
	A. M	P.M		P. M.	P.M.

* Stop on signal. B Breakfast. S Supper.
Special Round trip rates will be made for Sunday trains.

N. MONSARRAT, Gen'l Supt. Akron, O
E. T. AFFLECK, General Passenger Ag't, Columbus, O.

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POPULAR THOROUGHFARE.
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Connections in Union Depots for all Points.

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FAST TIME!

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TRAVELERS' REGISTER.

Lake Shore & Michigan Southern.

Trains marked with a * are the only trains that arrive and depart in this city on Sundays.

ARRIVALS.	a.m.	a.m.	p.m.	p.m.
Through from East	*2 50	*6 35	1 25	*1 40
Through from East	.....	.....	.....	*7 05
N. Y. & Chicago Ex	.....	12 23	.....	.....
Conneaut Accommoda'n	8 40	.....	.....	.....
Nottingham Accom'd'n	†10 05	.....	†4 45	.....
Elyria Accommodation	8 50	.....	.....	.....
From West via Sandusky	*7 05	11 00	.....	10 12
Fast Express	*1 35	.....	.....	.....
From West via Norwalk	.....	11 00	2 25	10 10
Pt. Clinton Accom'dat'n	.....	11 00	.....	.....
DEPARTURES.	a.m.	a.m.	p.m.	p.m.
Through Eastern Train	*7 30	11 15	*2 55	10 35
Fast N. Y. Express	*1 50	.....	.....	.....
Conneaut Accommod'n	.....	.....	4 50	.....
Nottingham Accom'd'n	10 00	.....	†2 15	.....
Elyria Accommodation	.....	.....	5 00	.....
West via Norwalk	6 40	.....	3 30	*7 35
West via Sandusky	3 05	7 00	*2 05	5 00
N. Y. & Chicago Ex	.....	12 33	.....	.....
Pt. Clinton Accom'dat'n	.....	.....	5 00	.....

Cleveland, Columbus, Cincinnati & Indianapolis.

ARRIVALS.	
No. 2 Col. & Cin. & Ind'pous Ex	*7 10 A.M
No. 8 C. T. V. & W. & Clev. Accom	10 30
No. 12 St. Louis & New York Exp	*3 00 P.M
No 6 Indianapolis & Columbus Exp	10 20
No. 10 Wheeling & Cleveland Exp	7 15
No. 4 Special Cin. & New York Exp	*3 40
DEPARTURES.	
No. 1 Cincinnati & Columbus Exp	8 00 A.M
No. 11 Cleve, Indianap. & Wheel'g Ex	7 10
No. 3 Special St. Louis & Cincinnati Ex	1 55 P.M
No. 5 Night Express	*7 25
No. 7 C. T. V. & W. & Col. Accom	4 00

†This train runs daily to Indianapolis and St. Louis, and daily, except Sunday, to Cincinnati.

Cleveland, Tuscarawas Valley & Wheeling.

ARRIVALS.	
Wheeling & Cleveland Express	8 25 P.M
Uhrichsville Express	10 30 A.M
DEPARTURES.	
Wheeling & Cleveland Express	7 15 A.M
Uhrichsville Express	4 00 P.M

New York, Pennsylvania & Ohio.

ARRIVALS.	
No. 7 Mahoning Valley Accommo	10 55 A.M
No. 8 New York Express	*7 00 P.M
No. 1 New York Express	6 50 A.M
No. 3 Pittsburgh Express	*7 00 P.M
No. 5 Pittsburgh Express	2 00
New York Express	2 00
No. 9 Youngstown and Pitts. Local	10 15
DEPARTURES.	
No. 12 New York Express	*7 10 A.M
No. 4 Youngstown Local	11 00
No. 8 Mahoning Accommodation	4 25 P.M
No. 2 New York Express	10 45
No. 12 Pittsburgh Express	*7 10 A.M
No. 6 Pittsburgh & Main Line Express	2 30 P.M

Cleveland & Pittsburgh.

	ARRIVE.	DEPART
Pittsburg & Wheeling	1 45 P.M	8 50 A.M
Express	6 55	2 30 P.M
Alliance Accommodation	10 15 A.M	3 45
Ravenna Accommodation	8 35	5 35
Night Express	6 30 A.M	†11 40 P.M

† Night Express runs daily, except Saturday, by way of Wellsville, and on Saturday by way of Alliance.

Valley Railway.

ARRIVE.	DEPARTURES.
No. 2 Accom. 10 15 A.M	No. 1 Mail 8 15 A.M
No. 6 Express 1 35 P.M	No. 3 Accom. 2 30 P.M
No. 4 Mail 6 30 P.M	No. 5 Exp. 6 05

Special trains leave on Sunday at 8.30 A. M. and 4.20 P. M., arriving at Cleveland at 10 A. M. and 6.25 P. M.

Trains leave from Depot foot of South Water Street.

Connotton Valley Railway.

Arrive.	Depart.
No. 1 10 05 A.M	No. 4 10 05 A.M
No. 8 4 00 P.M	No. 2 4 40 P.M

All trains arrive and leave depot corner Commercial and Fifth Streets

Cleveland, Akron & Columbus Railroad,

Cleveland, Akron & Columbus Railroad, running over Cleveland & Pittsburgh Railroad to Hudson, for Akron, Columbus, etc.

	ARRIVE.	DEPART.
Mail	1 15 P.M	8 00 A.M
Express	7 25	1 50 P.M
Accommodation	10 10 A.M	3 45 P.M

CLEVELAND & PITTSBURGH

RAILROAD.

Trains leave Cleveland and arrive at the points named below as follows: Night Express runs daily, all other trains daily except Sundays.

	Mail.	Fast Line.	Accom.	Night Expr'ss.
Leave Cleveland	8 50 am	2 30 pm	3 45 pm	11 40 pm
Arrive Hudson	10 00	3 28	4 50	12 50 am
Ravenna	10 40	3 53	5 50	1 18
Alliance	11 25	4 25	6 05 pm	2 05
" Philadel	11 35 pm	7 15	.....	10 55
Salem	12 25	.....	.....	3 02
Canton	12 28	5 47	.....	3 20
Massillon via Alliance	12 50	6 06	.....	3 38
Akron	10 42 am	4 10	5 40 pm	.....
Pittsburgh	3 30 pm	7 45	.....	6 55
Wheeling	5 10	8 00	.....	8 55
Marietta	8 45	.....	.....	.....
Harrisburg	.....	4 15 am	.....	4 00 pm
Philadelphia	.....	7 50	.....	7 35
New York	.....	11 15	.....	10 35
Baltimore	.....	7 55	.....	7 20
Washington	.....	9 17	.....	8 47
Boston	.....	8 00 pm	.....	.....

Ravenna Accommodation leaves Cleveland at 5:30 p m, reaching Ravenna at 7:15 p m; Akron 7:23 p m.

Newburgh Accommodations leave Cleveland at 11:00 a m and 12:30 pm. Returning, leave Newburgh at 11:10 am and 1:30 pm.

Passengers for New York, Philadelphia, Baltimore, Washington, and all points east of Pittsburgh make but one change of cars, viz. at Union Depot, Pittsburgh, excepting those leaving on the Fast Line which has Pullman Sleepers from Cleveland to Philadelphia and New York.

The Fast Line leaving at 2;30 P. M. has elegant Pullman Palace Sleeping Cars through from Cleveland to New York without change. Pittsburgh Passengers who desire Parlor Car accommodations can secure seats in this car.

The Night Express has Pullman Sleeping Cars from Cleveland to Pittsburgh which can be occupied by passengers at Union Depot, Cleveland, any time after 9:00 P. M. At Pittsburgh passengers can take elegant through Parlor or Sleeping Cars for the East.

Sleeping and Parlor Car accommodations from Cleveland and Pittsburgh eastward can be secured at the Union Sleeping and Parlor Car Office Union Passenger Depot; of H. C. Marshall, Union Ticket Office, Weddell House; or of the Ticket Agent at the Euclid Avenue Station.

Through tickets can also be secured at the same points. Baggage checked through from the Union Depot or from Euclid Avenue Station,

By the 8:50 A. M. train a through car leaves daily for Akron, Gambier, Mt. Vernon, Columbus and immediate points, without change.

The 2:30 P. M. train has through car for Akron, Orrville, Columbus and immediate points, arriving in Columbus at 9:25 P. M.

By the 3:45 P. M. Accommodation train cars run through without change from Cleveland to Cuyahoga Falls, Akron and Millersburgh,

Night Express leaving Cleveland at 11:40 P. M., runs daily, and makes connection at Wellsville for Steubenville, Bridgeport, Wheeling, Bellaire and intermediate points. Every night in the week except Saturday the night express runs via Wellsville. On Saturday nights it runs via Alliance. All other trains run daily except Sunday.

Trains arrive at Cleveland.—Night Express at 6:30 P. M., having Pullman Sleeper from Pittsburgh; Ravenna Accommodation, 8:35 A. M., Alliance Accommodation, 10:15 A. M.; New York & Wheeling & Washington Mail, with Pullman Sleeping Car from New York and Philadelphia, 1:45 P. M.; New York, Philadelphia & Wheeling Express, 6:55 P. M.

WM. A. BALDWIN, General Manager.
E. A. FORD, Gen'l Pass. & Tkt. Agt. Pittsburgh, Pa.
C. L. KIMBALL, District Passenger Agent, corner Bank and St. Clair streets, Cleveland.

Cleveland to New York,

VIA THE

NEW YORK, PENNSYLVANIA AND OHIO RAILROAD.

Formerly Atlantic & Great Western Railroad.]

For New York, Boston and the East. The shortest and quickest route to Pittsburgh, Washington, Baltimore and the Southeast

Until further notice trains will leave the new Central Depot, South Water Street and Viaduct, as follows:

7:10A.M. LIGHTNING EXPRESS, (daily,) sleeping and hotel coaches from Leavittsburg. 8:55 a.m. To New York, Albany and Boston without change. Parlor car, Cleveland to Salamanca. Arrives at Meadville 11:20 a.m., (dinner); Franklin, 12:33 p.m.; Oil City, 1:00 p.m.; Corry, 1:00 p.m.; Jamestown, (Lake Chatauqua) 1:57 p.m.; Buffalo, 6:15 p.m.; Rochester, 8:30 p.m.; Hornellsville, 6:40 p.m., (supper); Corning, 8:25 p.m.; Elmira, 8:57 p.m.; Binghampton, 10:58 p.m.; Albany, 6:00 a.m.; Boston, 2:45 p.m.; arriving at New York, 6:50 a.m.

10:45 P.M. NIGHT EXPRESS, (daily except Sunday), Sleeping Coach from Leavittsburg to New York without change. Arrives at Youngstown 1:45 a.m.; Meadville, 3:50 a.m.; Corry, 5:20 a.m.; Jamestown, 6:22 a.m.; Buffalo, 9:45 a.m.; Rochester, 1:10 p.m.; Hornellsville, 11:20 a.m.; Corning, 12:53 p.m.; Elmira, 1:21 p.m.; Binghampton, 2:50 p.m.; New York, 9:25 p.m.

2:30 P.M. PITTSBURGH EXPRESS,—daily, through without change. Parlor Car, Cleveland to Pittsburgh, arrives at Youngstown, 5:00 p.m.; Pittsburgh, 7:48 p.m.; Washington, 7:30 a.m.; Baltimore, 8:15 a.m.; via Sharon and Sharpsville to Meadville 7:40 p.m.; Corry, 9:10 p. m.; Lakewood, 9:50 p. m.; Jamestown, 10:00 p. m.; Salamanca, 11:10 p. m.

4:25 P.M. MAHONING ACCOMMODATION, stopping at all way stations. Arrives at Youngstown, 7:25 p.m; Sharon, 8:30 p.m; Sharpsville 8:40 p.m; connects at Leavittsburg with train No. 20 for Meadville and intermediate points, arrives at Meadville, 11:05 p.m. Pittsburgh, 10:48 p. m.

7:10 A.M. PITTSBURGH EXPRESS,—(daily) through without change. Arrives at Youngstown, 9:50 a.m.; Sharon, 10:55 a.m.; Sharpsville, 11:05 a.m.; Pittsburgh, 12:45 p.m. Returning, leave Pittsburgh, 4:48 a.m., 8:33 a.m., and 1:13 p.m. and 4:20 p.m.

11:00 A.M. YOUNGSTOWN & PITTSBURGH Accommodation, stopping at all Way Stations, arriving at Youngstown 1:50 p.m.; Pittsburgh, 6:10 p.m. Trains arrive at Cleveland, 6:50 a.m., 10:55 a.m. 2:00, p.m. 7:30 p.m., and 10:15 p.m.

☞ This is the only route by which passengers can reach Corry, Elmira, Binghampton, New York City, and intermediate points WITHOUT CHANGE. No change to Boston and New England cities.

Baggage Checked Through to All Points East

☞ Through Tickets and information regarding the route can be obtained at the Union Ticket Office, corner Bank and Superior streets; at office 131 Bank street, and at new Depot of New York, Pennsylvania and Ohio Railway, South Water street and Viaduct, Cleveland.

A. E. CLARK, Gen. Pass'r. Agt., Cleveland, Ohio.
P. D. COOPER, Gen. Man'gr, Cleveland.
M. L. FOUTS, Pass. Agt., 131 Bank st., Cleveland.

NOTICE.—Hereafter all Passes must be returned to the General Passenger Agent within FIVE DAYS after date of expiration; otherwise they will be discontinued.

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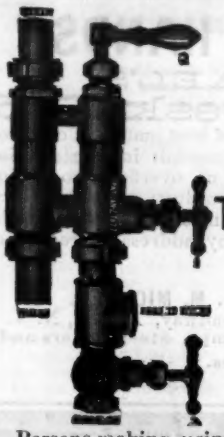

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IT IS THE

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Persons making, using, or dealing in Duplex Injectors, or Double Injectors, are hereby notified that all such Injectors in which a lifting jet apparatus raises or supplies water continuously to a forcing jet apparatus, are claimed, by the HANCOCK INSPIRATOR COMPANY, to infringe one or more patents owned by it.

On the 23d of June a suit in chancery was commenced by it against James Jenks, of Detroit, Mich., for making and selling the "Duplex Injector," so-called. Other infringers will be promptly sued.

The Inspirator Company will defend all who use or deal in the Hancock Inspirator against any suits which allege it to be an infringement of any patent.

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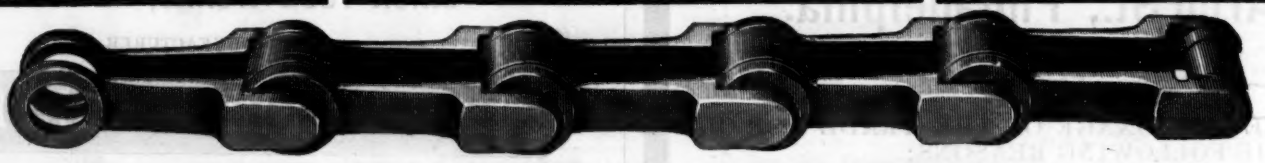
H. M. WHITNEY, President, Boston, Mass.

Fairbanks, Morse & Co., Special Agents.

CLEVELAND, OHIO.



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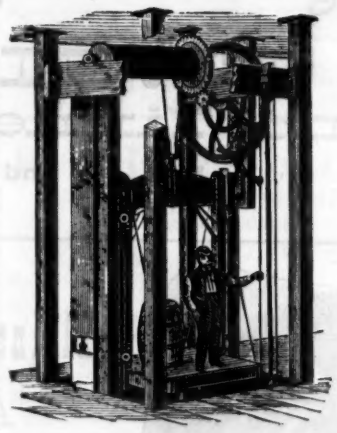

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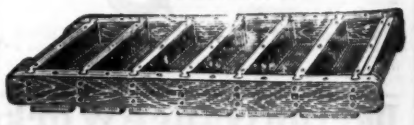

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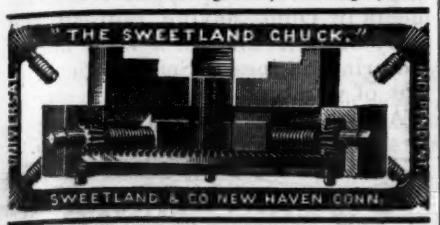

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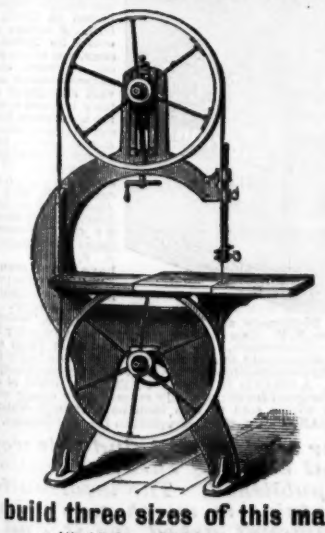

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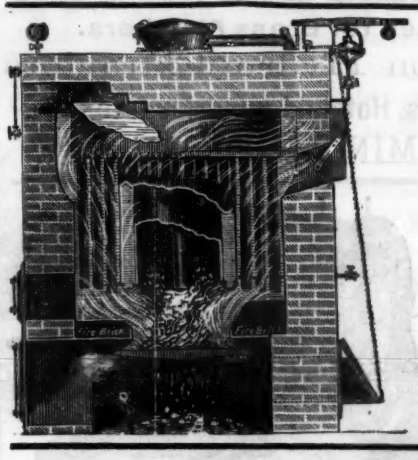

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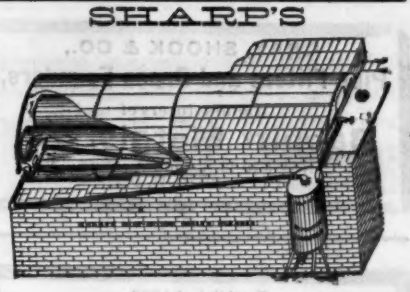

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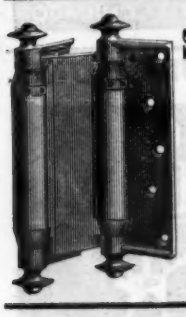

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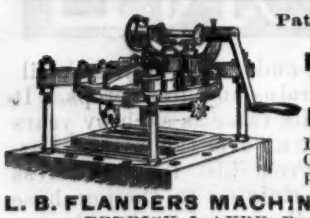

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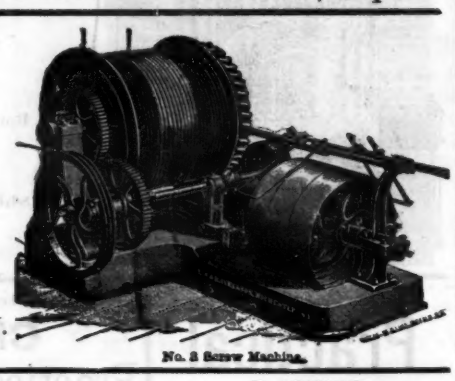

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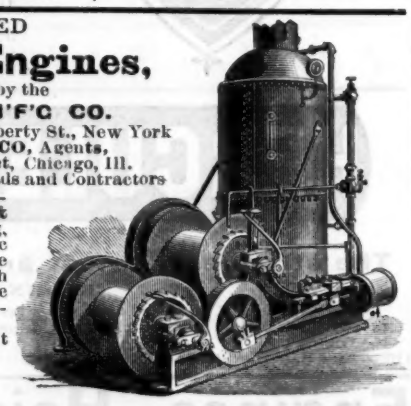

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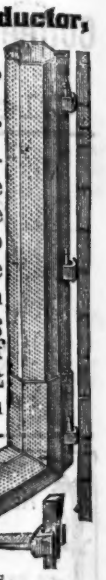

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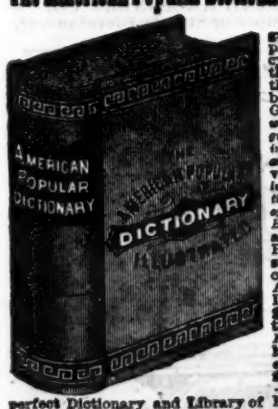

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